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THE
AMERICAN CYCLOPÆDIA.

VOL. XII.
MOTT-PALES.



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THE
AMERICAN CYCLOPÆDIA:

A
Popular Dictionary
OF
GENERAL KNOWLEDGE.

EDITED BY
GEORGE RIPLEY AND CHARLES A. DANA.

WITH SUPPLEMENT.

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THE

AMERICAN CYCLOPÆDIA.

MOTT

MOTT, Lucretia (COFFIN), an American minister of the society of Friends, born in Nantucket, Jan. 3, 1793. In 1804 her parents removed to Boston, where she went to school; subsequently she attended a boarding school in Dutchess co., N. Y., in which when 15 years old she became a teacher. In 1809 she rejoined her parents, who had removed to Philadelphia, and in 1811 married James Mott, who went into partnership with her father. In 1817 she took charge of a school in Philadelphia, and in 1818 began to preach. She travelled through New England, Pennsylvania, Maryland, and a part of Virginia, advocating the tenets of the Friends and speaking against intemperance and slavery. In the division of the society in 1827 she adhered to the Hicksites. She took an active part in the organization of the American anti-slavery society in Philadelphia in 1833, and was a delegate to the world's anti-slavery convention in London in 1840, but, with other woman delegates, was refused membership on account of her sex. She took a prominent part in the first woman's rights convention, held in 1848 at Seneca Falls, N. Y., over which her husband presided; and since then she has been conspicuous in such conventions and in yearly meetings of Friends. She still (1875) resides in Philadelphia.

MOTT, Valentine, an American surgeon, born at Glen Cove, Long Island, Aug. 20, 1785, died in New York, April, 26, 1865. He graduated as M.D. at Columbia college in 1806, and studied in London and Edinburgh. In 1809 he was called to the chair of surgery in Columbia college, which he held till the medical department of that institution was merged in the college of physicians and surgeons in 1813. He withdrew from that school in 1826, and with Dr. Hosack, Dr. Francis, Dr. Mitchell, and others, founded the Rutgers medical college, which, owing to a question about its

charter, existed but four years. Subsequently he lectured in New York in the college of physicians and surgeons, and in the university medical college, as professor of surgery and regional anatomy, to which last branch he devoted special attention. His professional reputation is mainly due to his original operations as a surgeon. As early as 1818 Dr. Mott placed a ligature around the brachio-cephalic trunk, or arteria innominata, only two inches from the heart, for aneurism of the right subclavian artery, for the first time in the history of surgery. Though all apparent supply of blood vessels was cut off from the right arm, pulsation could be distinctly felt in the radial artery, and the limb presented no evidences of sphacelation. On the 26th day, however, secondary hæmorrhage having set in, the life of the patient was speedily terminated. He successfully removed the entire right clavicle for malignant disease of that bone, where it was necessary to apply 40 ligatures. He was also the first to tie the primitive iliac artery for aneurism. He tied the common carotid 46 times, cut for stone 165 times, and amputated nearly 1,000 limbs. He early introduced an original operation for immobility of the lower jaw, and succeeded after many eminent surgeons had failed. In 1821 he performed the first operation for osteo-sarcoma of the lower jaw. He was the first surgeon who removed the lower jaw for necrosis. Up to an advanced period of life he continued to lecture and practise. He had been elected a member of the principal European medical societies, and made a knight of the fourth order of the Medjidieh of Turkey. Sir Astley Cooper said in regard to Dr. Mott: "He has performed more of the great operations than any man living, or that ever did live." In 1835 he visited Europe for his health, and travelled extensively through England, the continent, and the East. His

principal works are: "Travels in Europe and the East" (New York, 1842); translation of Velpeau's "Operative Surgery" (4 vols.); "Anniversary Discourse before the Graduates of the University of New York" (1860); "Mott's Cliniques," reported by Samuel W. Francis (1860); and several separate papers concerning special operations and cases, in medical periodicals and in the "Transactions" of the New York academy of medicine.

MOTTE (or **Mothe**) **CADILLAC**. See **CADILLAC**.

MOTTEVILLE, Françoise Bertaut de, a French authoress, born about 1621, died Dec. 29, 1689. She was brought up at the court of Anne of Austria, wife of Louis XIII.; but as Richelieu objected to the influence of her mother, who was of Spanish origin, she went with her parents to Normandy. She married in 1639 the octogenarian Langlois de Motteville, after whose death she rejoined Anne, now queen regent, in 1643, in whose service she remained until the death of the latter in 1666. Sainte-Beuve praises her tact and sagacity and her spotless life. Her *Mémoires* (5 vols., Amsterdam, 1723; new ed., 6 vols., 1739; 11 vols., Paris, 1822-'3) are regarded as the best authority on the history of the Fronde and the minority of Louis XIV., and are classed by Marmontel next to those of Mme. de Lafayette as the best works written by a woman.

MOTTEZ, Victor Louis, a French painter, born in Lille, Feb. 13, 1809. He studied under Ingres and Picot, and exhibited many fine religious paintings, and also several mythological pieces, including "Leda" and "Ulysses and the Sirens." His best known portraits are those of Guizot and Mlle. Judith. After five years' residence in London, he returned to Paris in 1856, and in 1864 completed paintings for the churches of St. Germain l'Auxerrois, St. Séverin, and St. Sulpice, his masterpieces. Among his later works are "Medea" (1865), "The Cursing of the Serpent," and "The Virgin bruising the Serpent's Head" (1869).

MOUFFLON. See **SHEEP**.

MOULD, Jacob Wrey, an American architect, born at Chiselhurst, England, Aug. 7, 1825. His father was a parliamentary solicitor in London. He graduated at King's college, London, in 1842, and studied under Owen Jones and Lewis Vulliamy, with both of whom he was associated in some of their most important works. In 1852 he removed to America, and after executing several buildings in and about New York, he was employed in the architectural department of the works in the Central park. In 1870 he was appointed architect-in-chief to the department of public parks. His designs are distinguished for picturesqueness of outline and originality of detail. His principal works are the church of the Messiah, a Presbyterian church in 42d street, the church of the Holy Trinity, and several buildings and structures in the city parks. In March, 1875, he was appointed architect-in-chief of the public works in Lima, Peru.

MOULINS, or **Moulins-sur-Allier**, a town of France, capital of the department of Allier, on the river Allier, 162 m. S. S. E. of Paris; pop. in 1866, 19,890. It is the seat of a bishop, and has many educational establishments and learned societies. Among the principal buildings are the cathedral of Notre Dame (which was founded in 1468 as a collegiate church, and was completed in 1861), the college, museum, hôtel de ville, public library, barracks, and hospital. Hardware and cutlery, silk and cotton hosiery, woollen and cotton goods, articles in ivory, and catgut are manufactured; and it has a trade in iron, wood, leather, charcoal, coal, wine, oil, salt, and cattle. Moulins was formerly the capital of Bourbonnais, and the dukes of Bourbon kept their court there with great splendor. But a single tower now remains of their once famous castle.

MOULMEIN. See **MAULMAIN**.

MOULTON, Louise Chandler, an American authoress, born in Pomfret, Conn., April 10, 1835. In 1855 she was married to William U. Moulton of Boston, where she now lives (1875), but has a summer residence at Pomfret. She has been a contributor to periodicals from her 15th year, and has published the following books: "This, That, and the Other" (12mo, Boston, 1854); "Juno Clifford," a novel (New York, 1855); "My Third Book," a collection of stories (1859); "Bedtime Stories" (Boston, 1873); "Some Women's Hearts," a collection of novelettes (1874); and "More Bedtime Stories" (1874).

MOULTRIE, a central county of Illinois, drained by the Kaskaskia river and its branches; area, 320 sq. m.; pop. in 1870, 10,385. It has a level or undulating surface and a fertile soil. The Terre Haute, Paris, and Decatur, the Chicago and Paducah, and the Chicago and Illinois Southern railroads traverse it. The chief productions in 1870 were 213,564 bushels of wheat, 1,753,141 of Indian corn, 263,992 of oats, 59,263 of potatoes, 21,010 lbs. of tobacco, 56,679 of wool, 247,264 of butter, and 9,214 tons of hay. There were 6,274 horses, 3,254 milch cows, 6,695 other cattle, 20,531 sheep, and 2,300 swine. Capital, Sullivan.

MOULTRIE, Fort, a fortification on Sullivan's island at the mouth of Charleston harbor, where a victory was gained, June 28, 1776, by the South Carolina troops under Col. William Moultrie over a British fleet commanded by Sir Peter Parker. Early in that month the fleet of 40 or 50 sail arrived off Charleston with a view of investing that place. A fort which Moultrie was then building was ordered to be finished at once. On the morning of the attack it consisted of a square with a bastion at each angle, built of palmetto logs laid in parallel rows 16 ft. apart, the interspaces being filled with sand. It mounted 26 guns, and had a garrison of 435 men. Four vessels of the British fleet, with 156 guns, anchored at a distance of 350 yards and opened fire; but the balls, sinking into the soft wood, produced lit-

tle effect, while the fire from the fort was very destructive to the vessels. The whole number of guns carried by the attacking fleet was 262, on eight vessels. The action lasted, with some intermissions, from about noon until after 9 o'clock in the evening, when such of the vessels as were not disabled drew off. Several auxiliary attempts were made in the mean while by other parts of the British force, but without result. The loss of the British was 205 killed and wounded; that of the Americans 11 killed and 26 wounded. In December, 1860, Fort Moultrie was occupied by a United States force under Major Robert Anderson, who on the 26th withdrew to Fort Sumter. (See ANDERSON, ROBERT.) Fort Moultrie now exists only in name. Sullivan's island, upon which it stood, after being almost devastated during the civil war, has since come to be a suburb and watering place of Charleston.

MOULTRIE, William, an American soldier, born in South Carolina in 1731, died in Charleston, Sept. 27, 1805. In 1761 he was appointed a captain of foot in a militia regiment raised against the Cherokees. At the outbreak of the revolutionary war he was appointed to the command of the second colonial regiment, and he also represented the parish of St. Helena in the provincial congress of 1775. In March, 1776, he was ordered to construct a fortress on Sullivan's island at the mouth of Charleston harbor, and was busy at the work when the enemy made his appearance. (See MOULTRIE, FORR.) In commemoration of Moultrie's bravery in defending the fort, it was subsequently called after his name. He was soon after put upon the continental establishment, was made a brigadier general, Sept. 16, 1776, and in February, 1779, he defeated a superior British force under Col. Gardner, near Beaufort. In May following, with about 1,200 militia, he opposed the advance of Gen. Prevost on Charleston, and held the city until the approach of Gen. Lincoln compelled Prevost to retire to Savannah. In the spring of 1780 Charleston was attacked for the third time by a strong land and sea force, and Moultrie, who was second in command, shared in the capitulation of the American troops. While a prisoner he was approached by the British officers with offers of pecuniary compensation and the command of a British regiment stationed in Jamaica if he would leave the American service. He replied: "Not the fee simple of all Jamaica should induce me to part with my integrity." After remaining nearly two years a prisoner, he was permitted to go to Philadelphia, where in February, 1782, he was exchanged for Gen. Burgoyne. He was made a major general, Oct. 15, 1782. In 1785 he was elected governor of South Carolina, and again in 1794. After the close of his term in 1796 he devoted most of his remaining years to the preparation of his "Memoirs of the Revolution" (2 vols., New York, 1802).

MOUND BIRD. See BRUSH TURKEY.

MOUNDS. See AMERICAN ANTIQUITIES.

MOUNDSVILLE, a town and the capital of Marshall co., West Virginia, 12 m. below Wheeling, on the left bank of the Ohio, between two streams called Big and Little Grave creeks; pop. in 1870, 1,500. The post office name was formerly Grave Creek. It derives its present name from a mound in the vicinity, one of the largest of the ancient mounds in the United States, and one of the most interesting of American antiquities. It is connected with a series of earthworks of ancient construction, and is 820 ft. in circumference at the base, about 70 ft. high, and at the summit 63 ft. in diameter. In 1838 a shaft was sunk from the apex of the mound to its base, and a horizontal tunnel made from the exterior of the base to the centre. Two sepulchral chambers were found, one at the base, the other 30 ft. above it. These chambers had been constructed of logs and covered with stones, but had sunk in from the decay of the woodwork. One skeleton was found in the upper chamber, and two in the lower. There were also found in these chambers nearly 4,000 shell beads, several ornaments made of mica, copper bracelets, and articles carved in stone. Ten other skeletons in an advanced stage of decay were found in making the excavation. It is asserted that among the articles dug from it was a small stone on which was sculptured an alphabetical inscription. This tablet is of dark, compact, silicious rock, and is oval, $1\frac{1}{2}$ in. long and $1\frac{1}{2}$ in. broad. It is of rude workmanship, but the characters are all distinct. The inscription consists of three lines and of 22 characters, with an ideographic sign. Much diversity of opinion exists as to the nature and origin of this inscription. Dr. Wills De Hass of Virginia, in a paper read before the American ethnological society at New York, adduced evidence and arguments which seem to establish the authenticity of the tablet, of which strong doubt had been expressed. He maintained that similar ones have been found in the mounds composing the Grave Creek group, among others a small globular stone having five characters enclosed in a cartouche.

MOUNT, William Sidney, an American painter, born in Setauket, L. I., Nov. 26, 1807, died there, Nov. 19, 1868. In 1826 he entered the school of the national academy of design, in 1828 painted his first picture, a portrait of himself, and produced afterward in New York "The Daughter of Jairus," a full-length portrait of Bishop Onderdonk, and several clever portraits of children, which gave him reputation; but he soon returned to Setauket, where he devoted himself wholly to genre art. His first picture of this class, a "Rustic Dance," was exhibited in New York in 1830, and was followed in succeeding years by "Husking Corn," "Walking the Crack," "Farmer's Nooning," "Wringing the Pigs," "Turning the Grindstone," "The Raffle," "The Courtship," "Boys Gambling in a Barn," "Turn of the

Leaf," "The Power of Music," "Music is Contagious," "Raffling for a Goose," "Just in Time," "California News," "Banjo Player," "Dance of the Haymakers," and others, most of which are in private galleries in New York, and "Bargaining for a Horse," in the New York historical society's collection. He excelled especially in humorous pictures of American rustic life, and in delineations of negro life and physiognomy.

MOUNTAIN, a considerable elevation of the earth's surface, either isolated or arranged in a linear manner. Great regions of the earth are much elevated above the sea, forming high plains, called table lands or plateaus, from which mountains often rise. Such are the great plain of Thibet, with an average height of 16,000 ft.; that of western Asia, from 4,000 to 8,000; and that of western North America, of about the same height, from which rise the Rocky mountains and the Sierra Nevada. The elevation of mountains is generally calculated from the sea level. With few exceptions the mountains of the earth are arranged in continuous lines or chains, and a mountain system consists of parallel chains with intervening valleys. The great mountain system of the American continent is that which has been called the Pacific highlands, extending from Alaska to Cape Horn along the W. part of the continent. It consists in the United States, exclusive of Alaska, of the Rocky mountains to the east and the Sierra Nevada and Cascade mountains to the west, rising from the broad table land already mentioned, and having between them the great central basin with its subordinate mountain ranges. The highest points in both of these chains attain about 15,000 ft. The highest mountains in Alaska (Mt. St. Elias) and Mexico (Popocatepetl and Orizaba) rise to a height of nearly 18,000 ft. In South America the same great continental system consists of two, and in some parts of its course of three chains, separated by narrow elevated valleys. The general breadth of the whole system of the Andes is between 100 and 300 m., and the greatest height is attained in the plateau of Bolivia and in Chili, where there are peaks of from 20,000 to 23,000 or, according to some, 25,000 ft. In eastern North America are the Atlantic highlands or Appalachians, extending from the gulf of St. Lawrence to Alabama; these attain their greatest elevation in the Black mountains of western North Carolina, where there are several peaks of over 6,000 ft., one reaching 6,700 ft., and in New Hampshire, where the highest, Mt. Washington, is 6,285 ft. In the intermediate portions the heights are less, and in New York the tidal valley of the Hudson traverses the range. To the north and west of the Hudson are the Adirondack, Helderberg, and Catskill mountains, which in their continuation southward form the Alleghany and Cumberland mountains. Between this belt and the eastern one, which, extending from the Green mountains and

White mountains of New England, and the Highlands of the Hudson, takes the name of the Blue Ridge S. of the Potomac, lies what is called the great Appalachian valley, which itself attains a considerable elevation in S. W. Virginia.—From the plateau of Brazil rises along its E. portion a chain corresponding to the Appalachian; and in Africa there are similar highlands on the two sides of the continent, those of the eastern attaining an elevation of 20,000 ft. A like arrangement of highlands is seen in Australia, where however the highest elevation is about 7,000 ft. In Europe the Scandinavian and the Ural mountains are N. and S. chains, like the Appalachians; but the great mountain systems of the eastern hemisphere have a general E. and W. direction from the Atlantic to the Pacific. The Pyrenees, the Alps, the Balkan, the Caucasus, the Himalaya, and various subordinate ranges, mark this great mountain belt. Of these the Pyrenees have a crest line of about 8,000 ft., but attain in some peaks 11,000; the Alps have an average height of from 10,000 to 12,000 ft., the highest peak being Mont Blanc, 15,732 (or 15,781) ft., while the Himalayas rise in many points to 25,000 ft., and attain in Mt. Everest 29,000 ft., and the Thian-shan range, N. of these, is from 15,000 to 20,000 ft. The chains of this great mountain region of the eastern hemisphere are not always parallel, but are often considerably divergent.—The slopes of mountains are generally very gradual. Thus the average ascent of the Andes from the E. side is about 60 ft. in a mile, and on the bolder W. slope from 100 to 150 ft. in a mile; while for the E. slope of the Rocky mountains the average ascent to the great plateau is not more than 10 ft. in a mile. A much more rapid inclination than any of these is seen for isolated peaks, of which a very remarkable sample is Mont Blanc, which rises from the valleys on either side at an inclination of about 30°. The slope of the volcanic cone of Jorullo in Mexico is about the same, while those of Mt. Etna and Mauna Loa in the Hawaiian islands (reckoning from the base) are not more than 5° or 6°. The relations of mountains to climate are very important, but the discussion of them belongs to meteorology.—The early history of mountains, or orography, as it is called, presents crude notions. By the older geologists mountains were supposed to be thrust up by some force from within, and were compared to bubbles on the earth's crust. Some geologists of the present century have maintained this notion, and have even speculated upon the cataclysmal effects of a sudden upheaval of a mountain chain like the Pyrenees from beneath the ocean. But these conceptions have given place to more rational ideas. We must distinguish two classes of mountains, of widely different origin: those which are produced by the accumulation of matters ejected from volcanic vents, and those which have been formed by erosion. The first class, of

which Etna and Vesuvius may be taken as types, have been built up as an ant hill is raised by matters brought grain by grain from below the surface. Successive overflows of molten rock or lava, and showers of dust and scoriæ, the solidified scum of the lava, have heaped up these volcanic cones; while from time to time fissures or ruptures in the mass have allowed the injection of dikes of molten matter, which in cooling have given solidity to the whole. Volcanic cones are in fact generated in the air by the force of gravity. Volcanic vents may occur alike beneath the sea, in low plains, or on elevated plateaus, and sometimes from the summits of mountains not themselves volcanic. (See VOLCANO.) But the mountains of purely volcanic origin are insignificant when compared with the great systems of mountains which are not volcanic, or in which the presence of volcanic vents is but a secondary fact. These mountains, whether composed of aqueous or of igneous rocks, have had a very different origin from volcanic cones. They are due to erosion, and are the remains of great plateaus, the larger part of which has been removed. They are but fragments of the upper crust of the earth, separated from each other by valleys which represent the absence or the removal of mountain land. The popular conception is that mountain chains are due to the folding and plication of strata; but careful study of their structure shows that these are but accidents of structure, in no way essential to the formation of mountains, and sometimes absent. To De Montlosier and to J. P. Lesley we owe our first conceptions of the true nature and origin of mountains and valleys, and to James Hall its further elucidation and its illustration by the facts of North American geology. That the crust of the earth is not rigid, but yielding, and subject to movements of depression and elevation, due to a disturbance of its equilibrium, which have in all ages been operating, is evident from the distribution of sedimentary deposits in past geological periods. In addition to these there are other movements which are conceived to be due to the contraction of the earth's nucleus, resulting also in movements of depression and elevation of the surface, and in corrugations of portions of the crust. The result of these is seen in undulations of the stratified rocks, which are sometimes very slight and regular, but at other times both marked and irregular, occasionally giving rise to great overturns, folds, or inversions, and sometimes enclosing a portion of the rocks in a great fold until there is an inversion of the pinched-up strata on both sides of the axis of the fold, by which they come to present a fan-like structure when seen in transverse section. In other cases occur breaks or slidings of the strata on one another, and frequently more or less nearly vertical displacements, or faults, as they are called, by which the strata on one side of a line of fracture may be raised several thousand feet above

the same strata on the other side. These various disturbances of the strata influence in many ways the eroding agencies of the elements, so that the mountain outlines and the distribution of mountains and valleys depend upon these accidents, though not the elevation of the mountain plateau. Thus the crest of a fold from which the strata dip in opposite directions, making what is called in stratigraphy an anticlinal axis, will generally be fractured by the strain which this part has suffered, and will then present a line of weakness which becomes a line of erosion. Valleys are thus cut out, and the strata between the adjacent anticlinals, escaping the eroding action, form a synclinal mountain range, the beds in their natural order dipping from the valleys on each side toward the centre of the mountain. Such a condition of things is seen in the anthracite region of Pennsylvania, in the Catskill mountains of New York, and in western Vermont. From irregularities in the undulations, from faults, or from the intervention of harder and softer beds, it often happens that the process of erosion is less regular than this. Sometimes an anticlinal mountain appears; at other times an anticlinal mountain is divided, presenting two monoclinal mountains, or, as the result of a great fault in the strata, a single mountain of this kind in which the strata dip to one side. For a further discussion of the various forms of mountain structure, see Lesley's "Manual of Coal and its Topography."—The structure of mountains is best studied in regions of uncrystalline rocks, where the strata have not been too much disturbed, and where stratification is very evident, as in the palæozoic rocks of the Appalachians. In the crystalline eozoic rocks of this mountain system, where the strata are greatly disturbed and nearly vertical, the study of mountain structure is much more difficult. Mountains do not owe their elevation to any folding, or crushing, or piling up of the strata. The influence of folding has been well pointed out by Hall, who has shown the relations of the elevations of palæozoic rocks in the United States to the accumulation of sediments. In the upper part of the Mississippi valley, where the palæozoic rocks are represented by 3,000 or 4,000 ft. of sediments, we find hills made up of horizontal strata, the lower Cambrian rocks which form the base of the hills being everywhere above the water level, while the height of the hills is equal to the vertical thickness of the strata which compose them. In Pennsylvania, on the contrary, where the palæozoic strata have a vertical thickness of about 40,000 ft., the synclinal mountains, having in their summits the upper beds of the series, are not more than 2,000 or 3,000 ft. high, the greater part of the strata having been removed from the anticlinal valleys while they are sunk far beneath the mountains. It follows from what has been said that in horizontal and synclinal mountains the newer rocks are at the top and the older ones at the base,

but in overturned and dislocated strata this is of course no longer the case. In regions where, as the result of great folds and overturns, the fan-like structure already described has been produced, the older rocks from beneath are made to surmount and rest upon the newer strata, which have folded and doubled up beneath them. The erosion of such a region gives rise to a mountain like Mont Blanc; in this the ancient crystalline strata, which elsewhere form the floor upon which repose the newer stratified rocks, rise above these, forming the summit of the mountain, while at lower levels on its flanks the newer strata seem to dip toward the centre of the mountain, but are really bent upon themselves and doubled up, as is seen in the valley of Chamouni. Mont Blanc, which served as a type to the early students of geology, is thus an exception. The crystalline strata which form its summit were looked upon as an upthrust of granite which had lifted upon its sides the newer stratified rocks, thus giving the mountain, as was imagined, an anticlinal structure. In the process of sculpturing the earth's surface by ocean currents, frost, rain, and rivers, the unequal erosion exposes the harder masses, and thus eruptive rocks lying in the midst of softer strata appear in the form of hills, as is seen in the trappean ranges of New Jersey and the Connecticut valley. Isolated peaks of a similar origin are found in the vicinity of Montreal, and are denuded masses of eruptive rock which were once included in the soft palæozoic strata of the region long since removed by erosion. They were perhaps the stocks or underground portions of volcanoes in palæozoic times.—The question of the geological age of mountains is twofold, including, first, that of the deposition of the rocks of which they are composed, and second, that of their uplifting and erosion. Élie de Beaumont, considering only the latter question, supposed all mountain chains having the same direction on the earth's surface to be of the same age; but this notion is no longer tenable, since a great mountain chain, such as the Appalachians, exhibits considerable variations in different parts of its course, from a N. and S. direction in parts of New England to one nearly E. and W. in other parts of its extension. As regards the age of the rocks of this great chain, while the Green and White mountains, the Adirondacks, and the Blue Ridge are eozoic, the Catskills, the Alleghanies, the Unaka, and the Cumberland ranges are composed of palæozoic sediments, and the whole Appalachian system was not uplifted until after the deposition of the coal. The study of the Alps shows that the elevation of this great mountain system was still later, since even tertiary rocks are involved in the folds and inversions of the strata.

MOUNTAIN. I. Jacob, a Canadian bishop, born in Norfolk, England, in 1750, died in Quebec, June 16, 1825. His grandfather, Jacob de Montaigne, a great-grandson of Montaigne the

essayist, was banished from France by the revocation of the edict of Nantes. He graduated at Caius college, Cambridge, in 1774, became a fellow in 1777, and in 1781 was nominated to the living of St. Andrew's, Norwich, holding besides several other livings. In 1793 he was appointed first Protestant bishop of Quebec. He found but nine clergymen in his diocese, and labored for 30 years to build churches and schools and to promote the spiritual welfare of his flock. II. George Jehoshaphat, second son of the preceding, born in Norwich, July 27, 1789, died in Quebec, Jan. 8, 1863. He graduated at Trinity college, Cambridge, in 1810, was ordained priest in 1813, and appointed evening lecturer in his father's cathedral. In 1814 he was nominated rector of Fredericton, New Brunswick, and in 1817 rector of Quebec and bishop's official. In 1821 he became archdeacon, and in 1825, during a mission to England, he received the degree of D. D. On his return Bishop Stuvard appointed him his examining chaplain, and in 1835 he was sent to England on business connected with the question of the clergy reserves. While there he was appointed bishop of Montreal, and given the entire charge of the Episcopal church in Lower Canada. He continued to administer the dioceses of Quebec and Montreal till 1850, when he assumed the title of bishop of Quebec. In 1844 he visited the missions on Red river, composing during his journeys "Songs of the Wilderness" (London, 1846). He was the founder of Bishop's college, Lennoxville, and of the church society, spending most of his income for these institutions and for charitable purposes. Some time before his death he declined the dignity of metropolitan of Canada. He published sermons and addresses, and a "Journal of a Northwest American Mission" (London, 1843).

MOUNTAINS OF THE MOON, a mountain range said to exist in central Africa, in which Ptolemy and other ancient geographers placed the sources of the Nile. On modern maps, until recently, the name was given to a great range which was supposed to cross the continent from the Indian ocean to the Atlantic. It is now known that no such range exists. Capt. Speke applied the name in 1858 to a range N. of the newly discovered lake Tanganyika, though incorrectly, according to Capt. Burton.

MOUNT AUBURN. See CAMBRIDGE (Mass.).

MOUNT DESERT, an island of the state of Maine, at the southern extremity of Hancock co., in Frenchman's bay, about 30 m. S. E. of Bangor; pop. in 1870, 3,935. The island is 14 m. long and 8 m. broad, and has an area of about 100 sq. m. It is divided into three towns, Eden, Mount Desert, and Tremont, and contains 11 post offices, 15 or 20 hotels, 35 school houses, and 6 churches. Ship building and the manufacture of lumber are carried on, and the cod and mackerel fisheries are pursued. A narrow bay or sound runs from the ocean at the S. side of the island into the interior in a northerly direc-

tion to the distance of 6 or 8 m. The scenery of the island is very grand and beautiful. The greater part of its surface is covered by seven ridges of mountains, whose highest peak, Mt. Adam or Mt. Green, rises 1,762 ft. above the sea. High up among the mountains are many beautiful lakes, the largest of which is several miles long. The S. E. coast is lined with stupendous cliffs; the most remarkable of these are Great Head and Schooner Head. In Frenchman's bay, on the E. side of Mount Desert, are five high rocky islands called the Porcupines, and about 20 m. to the southward in the open ocean is Mount Desert rock, the site of a noted lighthouse. Mount Desert is much resorted to in summer for the beauty of its scenery.—The island was discovered and named by the French about the beginning of the 17th century. M. de La Saussaye and Fathers Quentin, Lalemant, Biard, and Masse, with 25 colonists from France, landed here in May, 1613, built a small fort and a few cabins, and called the place St. Sauveur. This settlement was forcibly broken up in a few weeks by Gov. Argall of Virginia. The first permanent settlement was made by Abraham Somes, who in 1761 built a house at the head of the sound.

MOUNT EVEREST. See HIMALAYA MOUNTAINS, vol. viii., p. 732.

MOUNTFORD, William, an American clergyman, born in Kidderminster, England, May 31, 1816. He was educated at Manchester New college, and was minister of a Unitarian chapel in Manchester from 1838 to 1841, when he went to Lynn-Regis. In 1850 he removed to the United States, and soon after became minister of the first Unitarian church in Gloucester, Mass. He was in France and Italy from 1856 to 1860, when he returned, and has since resided in Boston. He has published "Martyria, a Legend" (London, 1845; Boston, 1846);

"Christianity the Deliverance of the Soul and its Life," sermons (London, 1846); "Euthanasia, or Happy Talks toward the End of Life" (Boston, 1848; with additions, 1850; new ed., 1874); "Thorpe, a quiet English Town, and Human Life therein" (1852); and "Miracles, Past and Present" (1870).

MOUNT PLEASANT, a town and the capital of Henry co., Iowa, on the Burlington and Missouri River railroad, 25 m. W. N. W. of Burlington, and 110 m. E. S. E. of Des Moines; pop. in 1870, 4,245. It stands on an elevated prairie, surrounded on all sides but the east by Big creek, an affluent of Skunk river. The adjacent country is highly productive. The town is the seat of one of the state asylums for the insane, and of Iowa Wesleyan university and German college, both under the control of the Methodists. The university was established in 1855, admits both sexes, and has preparatory, collegiate, theological, and law departments, and a school of pharmacy. In 1873-'4 it had 14 instructors, 200 students, and a library of 3,000 volumes. German college was organized in 1873, and in 1873-'4 had 4 instructors and 15 students. Mount Pleasant has graded public schools, a high school, two national banks, two weekly newspapers, two monthly periodicals, and eleven churches.

MOUNTRAILLE, a N. W. county of Dakota, bordering on British America, and bounded S. W. by the Missouri river, recently formed, and not included in the census of 1870; area, about 3,200 sq. m. It is drained by White Earth and Little Knife rivers, affluents of the Missouri, and by a fork of Mouse river. The surface is elevated, being occupied by the Plateau du Coteau du Missouri.

MOUNT SAINT ELIAS. See ALASKA.

MOUNT VERNON, the home and burial place of George Washington, on the right bank of



Mount Vernon.

the Potomac in Fairfax co., Va., 9 m. S. by W. of Alexandria and 15 m. from Washington

city. At the time of Washington's decease the estate comprised several thousand acres. The

mansion is beautifully situated on a swelling height crowned with trees and commanding a fine view up and down the Potomac. The house is of wood, two stories high and 96 ft. long, with a lofty portico extending along the whole front. On the ground floor are six rooms, none large except the dining room. The library and Washington's bedroom remain as they were at the time of his death, and contain many articles of great interest. In front of the house sloping to the river is a lawn of five or six acres. About 300 yards S. of the mansion, on a hillside in full view of the river, is the old family vault, where the body of Washington was first laid and remained till 1830, when it was removed to a new vault at no great distance on the edge of a deep wooded dell. Mount Vernon mansion was built by George Washington's elder brother Lawrence, who settled there in 1743, and named the estate in honor of Admiral Vernon, under whom he had served in the West Indies. George Washington added wings to the mansion, and greatly enlarged and embellished the estate, which was his home from boyhood till his death. He bequeathed it to Bushrod Washington, from whom it passed to his nephew John A. Washington. By him the mansion and 200 acres of land were sold in 1858 for \$200,000 to the "Ladies' Mount Vernon Association," who design to hold it in perpetuity as a place of public resort and pilgrimage.

MOUNT VERNON. I. A city and the capital of Knox co., Ohio, on the N. bank of Vernon river, and on the Cleveland, Mt. Vernon, and Columbus railroad, and the Lake Erie division of the Baltimore and Ohio line, 40 m. N. N. E. of Columbus; pop. in 1870, 4,876. It is well and compactly built on gently ascending ground, is lighted with gas, and has many handsome residences. It is surrounded by a fertile and well cultivated country, and has considerable trade. The river affords good water power. The city contains two iron foundries, a woollen factory, two flouring mills, two saw mills, two national banks, graded public schools, including a high school, two weekly newspapers, and eleven churches. It was laid out in 1805. II. A town and the capital of Posey co., Indiana, on a bend of the Ohio river, in the S. W. corner of the state, and on the St. Louis and Southeastern railroad, 160 m. S. W. of Indianapolis; pop. in 1870, 2,880. It stands on a bluff commanding a view of the river, and has an active trade. It contains two banks, two flouring mills, two saw mills, a foundry, a planing mill, and other manufactories, several schools, two weekly newspapers, and seven churches.

MOURNING, an outward manifestation of grief, particularly on occasions of death. Every nation has some conventional form of mourning. The ancient Hebrews tore their garments, dishevelled their hair, threw dust or ashes on the head, and abstained from washing. During the time of mourning they sat on

the ground, and went bareheaded and barefooted. The usual period of mourning was seven days, but for Moses and Aaron they mourned a month. On public occasions professional mourning women were employed. The modern Jews preserve to some extent the customs of their forefathers, such as sitting on the ground, and making an incision in some part of their clothing to symbolize the old tearing of garments. In Jerusalem a weekly lamentation and wailing is still observed near the site of the temple. The rending of clothes was observed by the Egyptians, who also sprinkled their heads with dust and ashes, struck their breasts, allowed their hair to grow and their dress to hang neglected, went unwashed, and abstained from wine and other delicacies. The women ran crying through the streets with disordered hair and exposed bosoms. The Lycians regarded grief as unmanly, and had a law compelling men when they went into mourning to put on female garments. The Syrians wept for their dead several days in solitary places. The Persians rent their garments with wailing, and cut off their hair. The last was customary also among the Scythians.—The Greeks withdrew into retirement, cut off their hair, put on black, or in some states, as Argos, white garments, rolled themselves in the dust or mire, threw ashes on their heads, tore their clothes, never appeared in public without a veil, lacerated their faces, and frequently uttered the exclamation *ē, ē, ē*. When a popular general died, the whole army cut off their hair and the manes of their horses. In Athens the duration of mourning was about 30 days; in Sparta it was 11 days.—The Roman forms of mourning did not differ greatly from the Grecian. In the time of the republic the color of the mourning dress was black for both sexes, and it always continued so for men; but during the reign of Augustus a white veil was worn by women, and subsequently a complete costume of white became their conventional token of sorrow. Ornaments for the person were laid aside, and the men let their hair and beards grow long. The extreme duration of mourning by men was ten months, by women a year, but this period was abridged by the occurrence of any auspicious event, such as the birth of a child, the happening of any piece of good fortune to the family, certain religious feasts, or the consecration of a temple. The period of public mourning for the death of a great person or for a public disaster was fixed by special decree. At such times the forum, baths, shops, temples, schools of exercise, and other places of concourse were closed, the senators put aside the lat-clave, the consuls sat on a lower seat than usual, and the magistrates appeared without their badges of office. On private occasions the mourning was done almost wholly by the women; the men wore black only for a few days, and the domestic ceremonies in honor of the deceased terminated on the ninth day

after the funeral with a sacrifice called *novendiale*. A widow who married again during her time of mourning for a husband (ten months or a year) was accounted infamous and debarred from inheriting of her late spouse. Persons in mourning kept within doors, and the custom of tearing the garments was sometimes practised. Hired mourning women were employed at funerals by both Romans and Greeks. In the old tombs which have been opened in Palestine, Greece, and Italy are found lachrymatories or tear bottles, in which it was customary for mourners to preserve their tears.—Among the modern Syrians mourning women play a very important part at funerals. It is not unusual for families in moderate circumstances to be ruined by the expensive feasts and other commemorations which are held for weeks after the funeral.—In Arabia the men wear no mourning, and are silent in grief, but the women scream, tear their hair, and throw earth on their heads. The latter also stain their hands and feet with indigo, which they suffer to remain for eight days, and during this time they abstain from milk on the ground that its white color ill accords with the gloom of their minds. The hired mourning women of Medina dance before the house of the deceased, tearing their arms, faces, and hair.—The Chinese mourn in white, and on the death of a near relative every article of dress must be of that color. Less intense affliction is indicated simply by caps and girdles of white linen, and a very moderate degree of grief by shoes and queue cords of blue. Mourning on occasion of the death of a parent or husband is enforced by the penalties of 60 blows and a year's banishment. The duration of mourning is fixed by law. For a father or mother it is three years, but in the case of government officers it has been reduced to 27 months. During this period of mourning a Chinese cannot perform the duties of any public office. For 30 days after the demise the nearest kindred must not shave their heads nor change their dress. When the emperor dies all his subjects let their hair grow for 100 days. At funerals the relatives of the deceased furnish all who take part in the procession with mourning dresses, just as gloves and scarfs are given at the present day in Europe and America. They employ mourning women, whose faculty of shedding tears is extraordinary.—The Japanese mourning color is also white, but relatives in the ascending line and seniors neither mourn for their junior kindred nor go to their funerals. Persons in mourning stay at home for 50 days, abstain from animal food and from the intoxicating liquor *saki*, and neither shave their heads nor pare their nails. This period of 50 days, called the *imi*, is succeeded by the *buku*, or 13 months of a sort of "second mourning," during which it is not allowed to wear bright colors or enter a Shinto temple. These long periods are observed only on the death of parents; for

other relatives the *imi* and *buku* vary from 30 days and 13 months for a husband to 3 days and 7 days for cousins and their children.—In the Feejee islands, after the death of a chief, a general fast until evening is observed for 10 or 20 days, the women burn their bodies, and 50 or 100 fingers are amputated to be hung above the dead man's tomb. The ceremonies of domestic mourning consist of abstinence from delicate dishes, and from the use of oil on the person; the mourners sleep on the bare ground, and use only leaves for dress. These customs are optional; among those exacted by fashion are the "jumping of maggots," or a meeting of friends on the fourth day after the funeral to picture to themselves the corruption of the corpse, and the "causing to laugh" on the next night, when comic games are held. About the tenth day the women scourge all the men except the highest chiefs. Among the natives of New Caledonia there is a custom for women to burn parts of their bodies in time of mourning. The Hawaiians denote grief by painting the lower part of their faces black and knocking out their fore teeth. The North American Indians howl and wail, make speeches to the dead, and pierce the flesh with arrows and sharp stones.—Among all civilized modern nations there is a great similarity in mourning customs, and black is universally considered the proper color to be worn, although modern refinement has gone so far as to symbolize the gradual change from the depth of affliction to a state of cheerfulness by a gradual return from black to gay colors through the intermediate hues of purple and violet, which are recognized as "second mourning." The material of a mourning dress is also prescribed by fashion, being for ladies generally crape. The time varies, according to the degree of relationship of the deceased, from a week to a year, the latter being the period fixed by custom for a widow. Hired mourners are retained by the English as attendants at funerals, but their office is one of mere show, and they are commonly called mutes. In some parts of Ireland, however, the *keeners* or professional mourners, generally old women, are famous for their extravagant lamentations. It was anciently the custom in England to give mourning rings and suits at funerals. In Spain and France, of old, the color of grief was white. Certain forms of private as well as public mourning were prescribed by Napoleon I., but went out of use at the restoration. Court mourning in Europe for members of the reigning family, even in remote degrees, is prescribed by ceremonials which give the minutest directions as to dress. The sovereign wears violet, except in England, where the color is black; but violet was formerly used there also. The courtiers appear in black. Court mourning seldom lasts more than six months. Public mourning is not yet banished from the civilized world. It was witnessed in the United States on the death of Franklin, Washing-

ton, Lafayette, and Lincoln. Members of legislative, civic, military, and other associations usually wear a piece of crape on the left arm on public occasions for 30 days after the death of a comrade.

MOUSE, the common name of the smaller members of the rodent subfamily *murinæ*. This subfamily is characterized by incisors smooth in front and compressed laterally; molars $\frac{3}{2}$ - $\frac{3}{2}$ or $\frac{2}{2}$ - $\frac{2}{2}$, rooted, the anterior the largest; the ante-orbital foramen a deep narrow slit, widening above; palate mostly on one plane; the descending branch of the lower jaw has not the angles above the plane of the crowns of the molars; other characters in the palate and lower jaw sufficiently distinguish them from *arvicolinæ* or meadow mice; feet usually naked beneath; the hind legs the longest and five-toed, the anterior with only four and a kind of a wart for a thumb; clavicles complete; tail scaly, with hairs between the whorls of the scales. They hold their food in the fore paws, and sit on their haunches to eat it; most of them burrow and swim well. Reserving the larger species for the article RAT, this subfamily may be subdivided into two principal groups: *mures*, confined in the wild state entirely to the old world; and *sigmodontes*, exclusively American. The former have very large and broad molars, with three tubercles in each transverse series of the upper jaw; the latter have narrower molars, with two tubercles in each similar series. A third group, *merionides*, intermediate to the above, with plane molars and transverse complete lamellæ, is found in Africa and central Asia.—In the murine group of this subfamily, the genus *mus* (Linn.) has the molars of opposite sides parallel to each other, no cheek pouches, the upper lip divided, the whiskers in five series, the nose sharp and hairy to the cleft, and the large, prominent ears nearly naked; the nails are short, pointed and curved; palms naked, with five small balls, those of the hind feet the largest; the hair is soft and fine; the mammae are ten, three pairs on the



House Mouse (*Mus musculus*).

lower abdomen and two pairs on the chest. More than 50 species are described, including the house rats; the only one here called a mouse is the common little creature of our

houses (*M. musculus*, Linn.). This varies much in color, from almost black to pure white; the albino or white mice are a mere variety of the common animals, but have the ability of propagating their race *inter se*. "Singing mice" do not differ in appearance from ordinary mice, but make, especially at night, a whistling noise somewhat like the feeble chirp of a canary bird. The house mouse was originally a native of Europe and central Asia, but is now spread over most inhabited regions of the world; in some parts of the United States, and particularly in newly settled districts, it is replaced by the white-footed mouse, which commits about as much mischief in houses and out-buildings as the common mouse. Of European field mice may be mentioned the *M. sylvaticus* (Linn.), or wood mouse, found in fields and gardens, where it makes large deposits of provisions in subterranean burrows, laying up grain, nuts, acorns, &c., for winter use. It is smaller than



Nest and Head of Harvest Mouse.

the house mouse, reddish gray above, and white below; the hind legs are so long that it moves by jumps, making the transition to *meriones* (III.). The harvest mouse (*M. minutus*, Pall.; *M. messorius*, Shaw) is only $2\frac{1}{4}$ in. from end of nose to root of tail, this being about 2 in. more. These tiny mice make nests of leaves and straws among standing corn and in thistles, and are often carried into barns with the harvest, where they live and multiply; in winter they retire to burrows and corn ricks; the color is ruddy above and white below. The lined mouse (*M. pumilio*, Gmel.), from the Cape of Good Hope, weighs less than four scruples (80 grains). Some mice of the genus *dendromys* (Smith) live on trees; the upper incisors are grooved, the fore feet three-toed with a thumb-like wart, and the long tail is thinly haired and ringed; here belongs the *M. mesomelas* (Licht.).—Among the American or sigmodont mice are the genera *reithrodon* (Waterh.) and *hesperomys* (Waterh.). *Neoto-*

ma and *sigmodon* belong properly among the rats on account of the large size of all their species. In *reithrodon* the ears and tail are short and hairy, and the upper incisors are grooved longitudinally in front; three species of rat-like size have been found in the extreme southern portion of South America, while the North American ones resemble slender house mice; the body is depressed, limbs short, head broad and short, tail about as long as the body, thumb rudimentary and with a short nail, and heel hairy; the North American species are found in the southern states on the Atlantic border, and from St. Louis to the Pacific. The harvest mouse (*R. humilis*, Baird) is about 2½ in. long, with the tail a trifle less; in color and general appearance it so nearly resembles a small house mouse, that it can only be distinguished at the first glance by the grooved incisors; the eyes are small; it is rarely injurious to the farmer, preferring grass lands to grain fields for its habitation. In *hesperomys* or the vesper mice, the typical species have long tails scantily haired, large ears, the quick motions of the common mouse, and generally white feet and a whitish tail. The old genus was of very great extent, embracing a large portion of the American *muridæ*; the South American species, most of them too large to be considered mice, have been arranged by Burmeister under the genera *calomys*, *habrothrix*, and *oryzomys*, established by Waterhouse, the first resembling the common mouse, the second the meadow mice (*arvicolæ*), and the third the lemmings. Baird divides even the North American species into three groups, as follows: *hesperomys* (Waterh.), containing 13 species; *onychomys* (Baird) and *oryzomys* (Baird), each with a single species. In *hesperomys* the form is mouse-like, tail not less, or even longer than the body without the head, claws weak, hind legs and feet long, and soles naked or less than half hairy. The white-footed or deer mouse (*H. leucopus*, Le Conte) is between 3 and 4 in. long, with tail about the same; the color of the adult is yellowish brown above, darker on the back, the lower



Deer Mouse (*Hesperomys leucopus*).

parts of the body and tail and the upper surface of the feet white; the young are dark slaty; the eyes and ears are large, and the fur long and soft. It is distributed from Nova

Scotia to Virginia, and as far west as the Mississippi, and is a common inhabitant of houses and barns; it is nocturnal in its habits, as active as a squirrel, nesting in trees, in the fields, in barns and houses, and making a dwelling resembling a bird's nest; it feeds principally on grain, seeds, nuts, and acorns, and is very fond of maize; it produces two or three broods in a season, according to latitude, five or six at a birth; it is not very injurious to the farmer, most of the mischief commonly attributed to it being due to the *arvicolæ* or meadow mice; great numbers are destroyed by the smaller carnivorous mammals and birds. Allied species are found in Texas, California, the southern states, and on the Pacific coast. The cotton mouse (*H. gossypinus*, Le Conte) makes its nest under logs and in trees, often robbing the planter of more than a pound of cotton for a single nest. The hamster mouse (*H. myoides*, Gapper) is mentioned under HAMSTER. The prairie mouse (*H. Michiganensis*, Wagner) is 3½ in. long, with a tail of 1½ in., and the smallest of the genus; the color is grayish brown above, whitish beneath, with the cheeks yellow. The Missouri mouse (*H. leucogaster*, Fr. Max.), the type of the group *onychomys*, has the clumsy form of the *arvicola*, tail less than half the head and body, claws large and fossorial, the posterior two thirds of the soles densely furred, and the skull without crest; the body is 4 in. long and the tail 3½ in.; grayish brown above, passing into yellowish red and fulvous on the sides; feet and under surface of body and tail white; the eyes are large, the ears rather short, and the whiskers long; it lives on the seeds and roots of wild plants, and sometimes on corn. The rice-field mouse (*H. palustris*, Wag.), the type of *oryzomys* of Baird, has a rat-like form, ears nearly buried in the fur, coarse hair, tail longer than head and body, hind feet long, soles naked, and upper margin of the orbit raised into a compressed crest; it is more than 5 in. long, and the tail about the same; the color is rusty brown above and whitish below. It is found in the rice fields of Carolina and Georgia, burrowing in the dams just above the water line; it scratches up the newly planted rice, eats it in the milky state, and gleans it from the fields in autumn; it is a good swimmer and diver; it eats also seeds of marsh grasses, and small mollusks and crustaceans.

MOUTON, Georges. See LOBAU.

MOVERS, Franz Karl, a German orientalist, born in Koesfeld, Westphalia, July 17, 1806, died in Breslau, Sept. 28, 1856. He studied at Münster, was ordained in 1829, and officiated in the pulpit from 1830 to 1839, when he was appointed professor of Old Testament theology in the Catholic faculty of Breslau, which office he held till his death. His principal work, *Die Phönizier* (3 vols., Breslau and Berlin, 1840-'56), presents a comprehensive view of Phœnician history.

MOWATT (Ritchie), Anna Cora, an American authoress and actress, born in Bordeaux,

France (where her father, Samuel C. Ogden, a merchant of New York, was then established in business), in 1819, died in England, July 28, 1870. She was the 10th of a family of 17 children. Her early childhood was passed in a château in the neighborhood of Bordeaux, in the private theatre of which she frequently participated in juvenile dramatic performances. When she was about six years of age the family returned to New York. While at school she attracted the attention of James Mowatt, a lawyer of New York, with whom she made a runaway match in her 15th year. During the first two years of her married life she published two poems, "Pelayo, or the Cavern of Cavadonga" (1836), an epic in five cantos, and "The Reviewers Reviewed" (1837), a satire against the critics of the former poem. Her health failing, she made a visit of a year and a half to Europe, during which she wrote for private performance a play entitled "Gulzara, or the Persian Slave" (1840). After her return she gave a series of public dramatic readings in Boston, Providence, New York, and other cities. Her exertions produced a serious illness, and for two years she was a confirmed invalid, during which time she contributed to the magazines under the pseudonyme of Helen Berkley. In 1842 she published "The Fortune Hunter," a novel; in 1845 a five-act comedy entitled "Fashion," which was played at the Park theatre, New York, with considerable success; and in 1847 another drama entitled "Armand, or the Peer and the Peasant," which was represented at the Park theatre in 1848. On June 13, 1845, she made her public début at this theatre as Pauline in the "Lady of Lyons," and thenceforth for many years was a popular actress. In 1847 she made an extended professional visit to England, where in 1851 her husband died; and in 1854 she played a series of farewell engagements in the United States and left the stage. She was married on June 7 of that year to W. F. Ritchie, editor of the Richmond "Enquirer." Her later works are: "The Autobiography of an Actress" (1854); "Mimic Life" (1855); "The Twin Roses" (1857); "Fairy Fingers" (1865); "The Mute Singer" (1866); and "The Clergyman's Wife and other Sketches" (1867). She published also several compilations.

MOWER, a S. E. county of Minnesota, bordering on Iowa, and watered by several streams; area, 720 sq. m.; pop. in 1870, 10,447. It has an undulating surface, consisting mostly of prairies, and the soil is fertile. It is traversed by the Milwaukee and St. Paul and the Southern Minnesota railroads. The chief productions in 1870 were 673,017 bushels of wheat, 118,771 of Indian corn, 463,085 of oats, 39,975 of barley, 63,244 of potatoes, 7,670 lbs. of wool, 295,896 of butter, 44,470 of flax, and 18,151 tons of hay. There were 2,821 horses, 3,073 milch cows, 4,543 other cattle, 1,945 sheep, and 2,973 swine; 3 carriage factories, and 3 flour mills. Capital, Austin.

MOWING AND REAPING MACHINES, mechanical devices for cutting grain or grass by animal power. Though this invention was suggested by the ancient Romans, the first experiments toward practical results were made in Europe in the latter part of the 18th and early part of the present century. The first machines, however, which attained to much efficiency were made in the United States between 1830 and 1850. The first reaping machine on record was described about A. D. 60 by Pliny, who says that it was used on the plains of Rhætia. It had the form of a cart with a comb-like bar in front, which stripped off the ears of wheat and delivered them into a box, the straw being allowed to stand. It was propelled by an ox that walked behind the machine. A similar implement is now in use for gathering clover seed, called a header. The forerunner of the present form of machines, in which the gatherers or cutters were given increased velocity, was one constructed by Pitt in 1786, in which a cylinder armed with combs plucked off the ears and discharged them into a box. For some time after this the cutters were made upon the rotary principle, the motive power being, as ever since, the bearing wheels. In 1822 a reciprocating or to and fro motion was given to the cutters. Nearly all the inventors attached the power behind, only four previous to 1823 placing it in front. In 1806 Gladstone of England patented a front-draft side-cut machine having a revolving knife. A bar with fingers gathered the standing grain and held it to the knife. Ogle in 1822 made the first reciprocating knife, which was also attached to a forward-draft machine. He used a reel to gather the grain to the cutter, and also a platform which was tilted to drop it in portions. Bell's machine (1826) had a reel and a travelling apron which carried off the grain to one side. The names of Adams of New York, Ten Eyck of New Jersey, and Lane of Maine are among the earliest connected with the invention of harvesters in the United States. In 1833 Obed Hussey, then of Cincinnati, O., patented a machine to which he applied sawtoothed cutters and guards. This machine was at once put into practical operation. On July 12, 1837, a public exhibition of its operation, under the direction of the board of trustees of the Maryland agricultural society for the eastern shore of Maryland, gave great satisfaction. During the same season this machine cut in a satisfactory manner 180 acres of oats and barley on a farm in Maryland. The open-topped slotted finger was patented by Hussey in 1847. In 1834 Cyrus McCormick of Virginia patented a reaper, which, having been improved in 1845 and again in 1847, received a medal at the world's fair in London in 1851. It had a sickle-edged sectional knife, reciprocating by crank movement with the bearing and drive wheels; there was a reel, and a divider was used on each end of the platform. The reaper had a seat behind the platform. The names

of Haines, Ketchum, Manny, and Wood are prominent among inventors of improvements in mowers and harvesters. The practical use of self-rakers in this country dates from the invention of W. H. Seymour of New York in 1851, who arranged a quadrant-shaped platform directly behind the cutters, a reel to gather the grain, and a rake moving over the platform in the arc of a circle, depositing the sheaves on the ground. In 1856 Owen Dorsey of Maryland combined the reel and rake, and his improvement has been extensively used in this country and Europe, with some modifications, one of which was by Johnston in 1865, who arranged it so that the size of the sheaves, or gavels as they are called, could be regulated at the will of the driver.—Owing to the variety in form and the multiplicity of patented modifications of the several parts of the modern machines, and the impossibility of doing justice to all parties in an attempt to describe all the inventions within the limits of this article, we shall give a general description only of their construction and operation. These machines

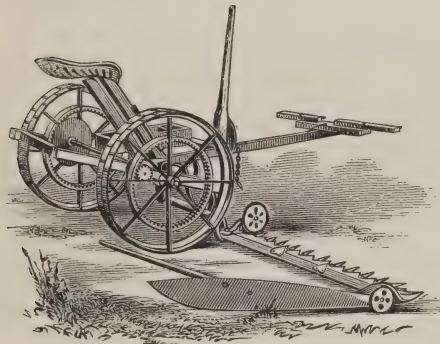


FIG. 1.—Mower.

consist of a strong framework, so constructed as to support a driver's seat, the cutting mechanism, and, when used for harvesting grain, a platform on which the grain falls when cut, and from which it is raked as often as a sufficient quantity for a bundle has accumulated. This framework is somewhat longer than the width of the swath to be cut, which is usually 5 ft., and of sufficient width for the platform, say 3 ft., except when used for cutting grass, when the platform is dispensed with, as the mown grass is allowed to fall over the cutters directly upon the ground. On the front edge of the frame is the cutting apparatus, consisting of a series of iron guards or pointed fingers, which are permanently fastened to the frame and extend about 7 in. beyond its edge, parallel to each other, horizontal and pointing forward. They are about $3\frac{1}{2}$ in. apart, and $1\frac{1}{2}$ in. wide at the base, lessening toward the point. Each guard has a horizontal mortise through it, and being on a line with each other they all form a continuous horizontal mortise or slit through the whole line of guards. The cutters are

formed of thin triangular plates of steel, fastened to a straight flat rod or plate of metal. These steel plates are arranged side by side, resembling a saw with teeth 3 in. wide at their base and 4 in. long, sharp on both sides, and terminating in a point. This saw or cutting plate is passed through the slits in the guards with the teeth pointing forward and their points coming even with the centres of the guards. One end of the saw is connected with a crank, which receives a rapid motion through intermediate cog wheels, from the tractive force and motion of the main or driving wheel. The framework with all its mechanism is supported by two or more wheels, the drive wheels being much larger than the others, and the axles so constructed as to admit of the platform, cutters, &c., being horizontal and suspended within a few inches of the ground. The pole is so attached to the framework as to allow the team to walk before the machine on the stubble of the last swath, while the platform with the cutters on its front edge extends on the right at right angles with the direction of the horses, so that the guards and cutters are presented to the standing grain or grass. A large reel, in front of and parallel with the series of cutters, is sometimes attached to the framework, and, being connected by a band or otherwise to the drive wheel, is made to revolve with it in the right direction to bend back the top of the standing grain or grass, past the cutters and over the platform, which tends to assist the cutting and to insure the backward fall of the grass upon the platform, or the ground in the rear of the machine. Some of the later machines, like the one shown in fig. 2, of which the "Champion" reaper of Springfield, O., is an example, have a sweep rake consisting of arms which, by means of a circular inclined plane, or stationary cam over which the heels of the arms are made to pass in revolving, become elevated when passing over the inner drive wheel, and lowered to the proper level when passing over the platform, so that the grain is gathered into parcels of a

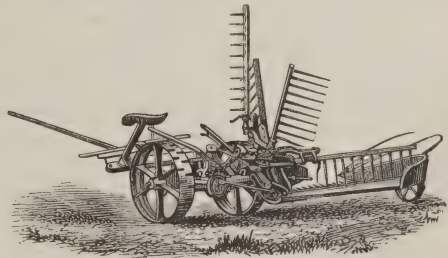


FIG. 2.—Reaper.

suitable size for sheaves. A seat for the driver is usually attached directly behind the team, above and over the outer drive wheel in the harvester, but in the mower it is usually between the two drive wheels. Some patents have been granted for machines for reaping

and threshing grain at the same operation, and many for a binding apparatus as an attachment to the reaper; but the more simple machines are the ones in general use.

MOXA, a counter-irritant used especially in cases of gout, rheumatism, and nervous disorders. It is of Japanese invention, having been in use in that country many centuries. The term is derived from the Japanese *mogusa*, "burning herb or grass." The finer woolly parts of the young leaves of wormwood, a species of *artemisia*, are applied to the skin in the form of small cones, and set on fire by means of a magnifying glass. They burn very slowly, and leave a scar or blister, which afterward breaks and discharges. The operation is not severely painful, except when it is applied twice in the same place. The Japanese have elaborate treatises on the art of moxa burning, according to the part to which it is applied. Its use in Japan is almost universal, and nearly every person, especially among the lower classes, is scarred with moxa spots, burned on the back to relieve pleurisy, asthma, and indigestion; on the legs for rheumatism and to strengthen the feet; on the arms to relieve sore or weak eyes. It is used occasionally in the practice of western physicians.

MOXOS, or **MOJOS**, a nation of Indians in South America, occupying a large tract in Bolivia, between lat. 13° and 16° S., and lon. 64° and 69° W. They believed that they originated on the spot, and from their superstitious reverence for its mountains, lakes, and rivers, each band feared to emigrate. They are lighter in color and taller than the neighboring nations; are industrious, cultivating the soil, fishing and hunting. The women spin and weave. Their manners are generally mild, though they have some cruel superstitions. Missions were attempted among them at a very early period by the Dominicans, and a great mission of Jesuits was founded by Cyprian Baraza in 1676. They stopped the feuds among the Moxos bands, increased the planting of maize and bananas, and taught them various arts, collecting them in 15 fine missions. The Moxos Christians suffered greatly from the attacks of the Portuguese, who carried off whole villages as slaves, but the suppression of the Jesuits was the greatest blow. They left 30,000 converts, but in less than 20 years the missions were reduced to 11. They have declined still further during the revolutions of the present century. In 1820 Velasco, the governor of the district, killed the cacique of San Pedro, and the Moxos rose in rebellion and put Velasco and his soldiers to death. In 1831 the Moxos missions, with those of the kindred Baures and Muchojeones, numbered only 13,620 souls in all, of whom 1,000 were in a wild state. They have a few books copied from generation to generation, and still play the old church music from notes. Even in their wild state they had a kind of signs which they used in writing. A history of the Moxos was written by F. Francis X.

Iraizos. Their language lacks *d*, *f*, *l*, is harmonious, and abounds in frequentative words. There is an *Arte de la lengua Moxa con su vocabulario*, by Father Marban (Lima, 1701).

MOZAMBIQUE (Port. *Moçambique*). **I.** A name applied to a large extent of the seaboard of E. Africa, belonging to Portugal; area, about 380,000 sq. m.; pop. about 300,000. It is bounded E. by the Mozambique channel, N. by Cape Delgado, lat. 10° 41' S., and S. by Delagoa bay, lat. 26° S.; on the west the boundary is indefinite. The coast includes the two prominent headlands of Cape Corrientes in the south and Cape Delgado in the north, and several large bays, the chief of which are Delagoa and Pamba. Between Delagoa bay and Cape Corrientes, and from Mozambique city to Cape Delgado, the shores are high and precipitous; while reefs and numerous islands lie off the land nearly throughout its entire length. Many large streams discharge themselves here; the principal is the Zambesi, the largest river of E. Africa, which debouches by several mouths at the middle point of the Mozambique coast. The climate is hot and unhealthy. Considerable tracts are cultivated and yield abundant crops of rice. The forests supply wood of great beauty and value. The rivers abound with hippopotami, which yield fine ivory. Gold was formerly obtained by washing the sands, but little is now produced; and copper ore is said to be found in several places. The vast plains of the interior abound in elephants, lions, and other wild animals, from which ivory and valuable skins are obtained. But the Portuguese have so neglected their possessions that the trade and government are now very feeble. The native chiefs are absolute rulers in most parts of the territory, and many of them are inimical to the Portuguese authority, which does not extend ten consecutive miles in any direction. Many of the subordinate officials and the entire garrison of 1,000 men are convicts. The coast for administrative purposes is divided into six sub-districts, of which Mozambique is the head. A governor general and secretary, appointed by the crown, administer the government, assisted by a *junta* composed of a president, treasurer, and 12 members; and it is represented by two members in the Lisbon cortes. The established religion is Roman Catholic, and is superintended by an apostolical prefect and a few priests. Education, like religion, is at a very low ebb, and most of the teachers reside in the capital. The Portuguese settlements, beginning from the north, are São João, Mozambique, Quilimane, Sena, Tete, Sofala, Inhamban, and Lourenço Marques; all of which have declined.—This coast was known to the Arabs centuries before its discovery by Europeans, and was occupied by them when first visited by the Portuguese in the beginning of 1498. The fame of its gold and the convenience of its ports for the Indian trade led the Portuguese to at-

tempt the expulsion of the original settlers. This was not difficult, and in 1508 they had obtained a footing in two places, and built a fort upon the island of Mozambique. They have made some unsuccessful attempts to penetrate the interior; but since 1860 a considerable part of the territory immediately adjacent to the Zambesi, and its tributary the Shire, to Lake Nyassa, has been explored by Dr. Livingstone. The slave trade is still carried on, but not so actively as formerly, and several Portuguese officials have been removed for permitting it or participating in it. In 1873 Sir Bartle Frere visited Mozambique and adjoining countries, and negotiated with the sultan of Zanzibar a treaty for the suppression of the slave traffic on the E. coast of Africa.

II. A city, capital of the territory, on a coral island near the mainland; pop. about 7,000. The centre of the island is in lat. $15^{\circ} 3' S.$, lon. $40^{\circ} 48' E.$ It is about $1\frac{1}{2}$ m. long and $\frac{1}{4}$ m. broad, in the form of a crescent, with the hollow side toward the sea; and, with two

other islets, it is near the mouth of a bay 6 m. long and 5 m. broad, which furnishes a safe and excellent harbor. The ground on which the town stands is from 20 to 50 ft. above the water, and the position is strongly fortified. The governor's palace is an extensive stone building. There are two churches and three chapels, a custom house, a hospital, prisons, tanks, and storehouses. The streets are very narrow, and the houses being all whitewashed, the glare and heat are very great, the mercury rising from 6° to 10° higher in the town than on the mainland. The inhabitants are a mixture of Indian, Arabian, and European, and their costumes are as various as their races. With the exception of the governor and his staff, the greater part of the European settlers are convicts. Other classes are descendants of the old Arab settlers, most of whom are sailors, the Banian traders from Hindostan, and negroes. Mozambique formerly supplied nearly all the markets in that part of the world with slaves, besides sending some to the West Indies.



Mozambique.

The legitimate traffic of the place is principally carried on by Arab ships, which bring piece goods and eastern produce from India, and take back ivory. It was made a free port a few years ago, but the rise of Zanzibar and the almost total suppression of the slave trade have interfered with its prosperity, though its export of ivory is still important.

MOZAMBIQUE CHANNEL, the passage between the E. coast of Africa and the island of Madagascar, lat. 12° to $25^{\circ} S.$ At its S. entrance it is 550 m. wide, at its N. nearly 600, and in the middle about 250. Its length from N. E. to S. W. is about 1,050 m. The Comoro islands lie at its N. entrance.

MOZART. **I.** Johann Georg Leopold, a German musician, born in Augsburg, Nov. 14, 1719, died May 28, 1787. He excelled on the organ when a youth, and paid his way while studying law by teaching music. Having gone to Salzburg to perfect his studies, he accepted the post of chamberlain to Count Thurn, a prebendary of the cathedral. In 1743 Archbishop

Sigismund appointed him chamber musician; a few years later he became court composer and leader of the orchestra, and in 1762 vice chapelmaster. In 1757 his musical works were already very numerous. His "Violin School" (1756), which laid the foundation for modern German violin playing, is remarkable as the first of its kind, and as teaching that mere execution is but a means to the true artistic end. He married in 1747 Anna Maria Pertlin, who bore him seven children, all of whom died in infancy excepting a daughter and a son. The daughter, Maria Anna Walburga Ignatia (born 1751, died 1829), became known as a pianist and afterward as a teacher, and married Baron Berchthold. **II.** Johannes Chrysostomus Wolfgang Amadeus (generally called Wolfgang), a German composer, son of the preceding, born in Salzburg, Jan. 27, 1756, died in Vienna, Dec. 5, 1791. When in his third year he attracted his father's notice by striking chords upon the harpsichord, and by readily learning passages in his sister's music

lessons. In his fourth year his father began to teach him short pieces for the harpsichord. In his fifth year he composed little melodies with simple but correct harmonies, which his father wrote out. Though music was his chief delight, he displayed great aptitude for languages and mathematics. In January, 1762, when Wolfgang was six years old, the elder Mozart took his two children to Munich, where they played before the elector and excited the deepest astonishment. In the autumn they visited Vienna, and were at once summoned to Schönbrunn. In October the boy was seized with the scarlet fever, which interrupted their performances, and after a visit to Presburg they reached home in January, 1763. Mozart at this time played at sight the second violin part in six trios, which one of his father's pupils had written during his absence. Schachtner relates that one day Wolfgang, who was playing his own violin, said to him: "Your violin is tuned half a quarter of a note lower than mine here, if you have left it as it was when I last played it." Schachtner's violin was brought and found to be as Wolfgang had said. This extraordinary memory for pitch afterward became conspicuous in Mozart's performances. In the summer of 1763 another tour was undertaken, extending to Paris and London. The boy most astonished old musicians by his organ playing, and in Heidelberg this was commemorated by an inscription placed upon the organ. After performances before various German princes and in cities, they at length reached Frankfort. The following is an extract from the advertisement of their concert in that city, on Aug. 30: "The girl, now in her 12th, and the boy, in his 8th year, will not only play concertos upon the harpsichord (the girl indeed the most difficult pieces of the greatest masters), but the boy will also perform a concerto upon a violin, accompany in symphonies upon the harpsichord, cover the keys with a cloth and play as well as if they were in sight, and also designate any note or chord struck at a distance, whether upon a harpsichord or any other musical instrument, or upon bells, glasses, musical clocks, &c. Finally, he will extemporize, not only upon the harpsichord, but also upon the organ, so long as any one desires, in all, even the most difficult keys that can be proposed, and thus prove that he understands the organ, which is totally different from the harpsichord in its treatment." After successful performances in Coblenz, Aix-la-Chapelle, and Brussels, they reached Paris in November. Here they won additional fame. Mozart accompanied Italian and French airs at sight, transposing them when required to do so, a task then more difficult than now, as the accompanist had to read the full score or depend upon a figured base. At this time his first work was published, consisting of four sonatas for harpsichord and violin. In April, 1764, the family went to London, where they were received with even

greater enthusiasm than in Paris. The queen accepted the dedication of six sonatas for pianoforte and violin from his pen, and the public crowded the concerts, in which he appeared in the new character of composer of symphonies for the orchestra. They returned through Holland up the Rhine, and through Switzerland to Salzburg, where they arrived in November, 1766. The elder Mozart now put both children to a systematic and thorough study of both instrumental execution and the theory of music. Wolfgang studied with unflagging zeal Emanuel Bach, Hasse, Handel, and the old Italian masters. A German passion cantata and a Latin *comædia*, "Apollo and Hyacinth," attest his progress in contrapuntal study and composition in 1767. The emperor Joseph II. suggested the composition of an opera by young Mozart on the occasion of the marriage of an Austrian princess with King Ferdinand of Naples. An Italian opera buffa, *La finta semplice*, was selected, and Wolfgang was engaged to compose it on the usual terms, 100 ducats. The score was finished soon after Easter. It is still preserved, and is fully up to the standard of similar works of that period, but owing to the intrigues of jealous musicians it was never performed. At the request of Maria Theresa, he composed a mass and conducted it in presence of the empress, Dec. 7, 1768. He also produced an operetta, "Bastien and Bastienne." The pecuniary success of this visit to Vienna was limited, but Mozart's increased fame led the archbishop Sigismund to appoint him concert master. The year 1769 was devoted to severe study. Two masses of this date indicate the pains taken by the father that his son should become a contrapuntist of the severest school, as the foundation for the future practice of free composition. In December of this year his father took him to Italy. Concerts were given in Verona, Mantua, and other places, Wolfgang appearing as singer, composer, and performer on the harpsichord, organ, and violin. His extemporaneous compositions had the greatest weight with musicians, and that of several arias to words from Metastasio displayed so much talent that the composition of an opera for the next winter was offered him under very flattering auspices. In Lodi he composed his first string quartet; and in Rome he reproduced Allegri's *Miserere* from hearing it in the Sistine chapel. Several weeks were next spent in Bologna, where Wolfgang had the advantage of much intercourse with Padre Martini, and where he became a member of the philharmonic society. He went thence to Milan, where he wrote his opera *Mitridate, re di Ponto*. It was finished and rehearsed in less than two months, and on Dec. 26, 1770, successfully given, Wolfgang presiding at the harpsichord. It ran 20 nights, and when he left Milan the score remained behind, to fill orders for five copies. They visited Turin, Padua (where an oratorio was ordered from Wolfgang, prob-

ably the *Betulia liberata*), Vicenza, and Verona, and reached home in March, 1771. Maria Theresa had ordered an opera by Hasse and a serenata by Mozart for the occasion of the marriage of the archduke Ferdinand with a daughter of the prince of Modena, which was to be celebrated in Milan with great splendor. It was September before the text to the serenata, *Ascanio in Alba*, in two acts with ballet, was delivered, and scarcely six weeks were left for the composition and rehearsal of the work; but it was ready in time, and wholly eclipsed Hasse's opera. Just as they reached Salzburg again, Archbishop Sigismund died. His successor, Hieronymus, Count Colloredo, did all in his power to break the spirit, crush the hopes, and ruin the prospects of young Mozart. For the festivities of his installation Mozart was ordered to compose Metastasio's opera, *Il sogno di Scipione*. It was a hasty composition, and bears more marks of being a mere occasional piece than any other of his works. In November he again reached Milan, bringing with him a part of the recitative of an opera which had been ordered, but changes in the text forced him to rewrite most of it. The singers were not yet there for whom he was to adapt the principal parts. It was already December, and only the recitative, choruses, and overture were finished. Yet on the 26th it was publicly given, and, in spite of a bad performance, was a success. It was repeated more than 20 times; but notwithstanding its success it was Mozart's last opera written for the stage in Italy, because Hieronymus henceforth refused his concert master, save in a single instance, leave of absence. In the autumn of 1774 came an order for a comic opera for Munich. Hieronymus stood in such relations to the elector, that he could not refuse Mozart the necessary leave of absence. The fine orchestra and excellent singers were a new spur to the young man, and this effort surpassed all his previous ones. The opera was *La finta giardiniera*, performed Jan. 13, 1775. A visit of Maria Theresa's youngest son, Maximilian, afterward elector of Cologne, to Salzburg, was the occasion of Mozart's last youthful operatic composition; it was Metastasio's *Il repastore*. During the next two years he filled his position as concert master at a court where there was a constant demand upon him as performer and composer. He was the favorite of all classes, and had but one enemy, the man upon whom he depended for subsistence. He was wretchedly paid, and the family avoided debt only by the most rigid economy. Another artistic tour was a necessity, and as a preparation for this Mozart went again through a course of study in perfecting himself as a performer upon the organ, harpsichord, and violin. In the autumn of 1777 the father petitioned for leave of absence for himself and son. The request was rudely refused. Wolfgang, now of age, immediately resigned his place as concert master. He was the first pianist, one of the first

organists, and in the highest rank of violinists in Europe; and the author of more than 200 works, from the opera, grand mass, and symphony, down through all classes of compositions. He first went to Munich with his mother, but there was no vacancy; and he turned his steps to Mannheim, where he could not obtain employment. He stayed till March, 1778, partly in consequence of a passion for a beautiful young singer, Aloysia Weber. The mother and son now tried Paris, where they arrived March 23. The contest between the Gluckists and Piccinists was at its height, and they with the French composers filled the stage. Baron Grimm received the Mozarts with great kindness; but he belonged to the Italian party. He procured Mozart a few pupils, who were his main dependence during his stay in Paris. Le Gros, the conductor of the *concerts spirituels*, and others, were very ready to use the young composer's talents for their own benefit, until he was forced to refuse any application for new music not accompanied by the offer of a reasonable compensation. The spring passed away, and the prospect began to improve. Le Gros ordered a symphony, which was given with the greatest applause. At this time (July 3) Mme. Mozart died, and Mozart's father ordered his return to Salzburg. He felt it to be his duty to obey, although fortune was evidently turning in his favor in Paris. The time spent there had been of great value to him. He had made himself familiar with many of the principal works of the three great schools of opera, Gluck's, the Italian, and the purely French. The coming of Christian Bach from London, and his friendship for Mozart, opened a prospect also in the English capital; the place of organist at Versailles, almost a sinecure, had been proposed for him. He delayed at Munich, where he met the Weber family and found that Aloysia's love for him had grown cold; and he did not reach Salzburg till January, 1779. Mozart was now "concert master and court and cathedral organist;" the salary was small, but, together with that of the father and what he earned by teaching, enabled the family to live in comfort. It was stipulated in the new contract with the archbishop that leave of absence should be granted at reasonable intervals, for the production of new works in other cities. So passed nearly two years, Mozart being called upon continually for new music for church and chamber, and supplying the demand with a succession of works of increasing excellence. Of dramatic music during this period he produced only the choruses and *entr'actes* to the play of "Thamos, King of Egypt," and an unfinished opera, *Zaide*. In 1780 he received the order for *Idomeneo*, the opera seria for the ensuing carnival, which was produced Jan. 29, 1781. Five years had elapsed since his last work for the operatic stage, which had been in the formal Italian style. *Idomeneo* from the character of the text was of the same school, but bears marks of the composer's

studies at Paris, and exhibits proofs of a genius rapidly becoming independent of traditional trammels. It was received with great applause. Mozart had hopes of obtaining a permanent appointment from the elector Charles Theodore, when he received a peremptory order from the archbishop to meet him in Vienna. Mozart and two other musicians in the archbishop's train dined with the two chamberlains and the three head cooks. The archbishop exhibited his concert master both as performer and composer, but took care that he should have no opportunity of playing where he could increase his income; and it was only through the persistency of men whose request Hieronymus dared not refuse that Mozart was permitted to play in the grand annual charitable concert. The impression made by him on this occasion was remarkable even in Vienna. His success is the only known reason why Mozart was ordered to return to Salzburg early in May. An accident caused him to delay a few days, and when he called on his master to excuse himself and take leave, he was received with a torrent of abuse. Remembering the needy circumstances of his father, he had borne the indignities to which he was subjected for six weeks, but he could endure them no longer, and tendered his resignation. The archbishop took no notice of it, and he repeated his application on June 8, upon which Count Arco, "master of the kitchen," grossly abused him and turned him out of the room. Nothing but the remonstrances of the father prevented the son from publicly calling Arco to account. No cause has ever been suggested for the hatred of the archbishop, except that the Mozarts disdained to play the part of flatterers. Mozart now gave lessons and concerts, and published music by subscription. He resided for some months with the Weber family in Vienna, where Aloysia, who had married Lange the actor, was engaged as a singer. The emperor Joseph, who was then busy with his project of establishing an opera devoted to German works, and who was friendly to Mozart, ordered a composition from him. This was the opera "Belmont and Constanza." Mozart received the text in July, 1781, and the music was soon ready; but owing to the opposition of the singers and orchestra, urged on by the Italian faction, the opera was not produced till July 12, 1782, and then only by express command of the emperor. In the mean time Mozart had become enamored of Constanza Weber, sister of Aloysia, and his father, apparently believing the groundless stories respecting their intimacy, gave an unwilling consent to their marriage, which took place Aug. 4, 1782. They had several children, of whom only two survived infancy. The emperor having given up his idea of establishing a German opera, and the Italian school continuing to thwart his progress, Mozart endeavored in 1783 to compete with it by procuring popular texts, but was successful only after his acquaintance with Da

Ponte, who furnished him with the libretto of the "Marriage of Figaro." Beaumarchais's play was just then exciting extraordinary interest in Paris. Mozart saw the capabilities of the subject, and proposed to Da Ponte to make it the theme of an Italian opera text. It was finished in six weeks. At the first performance, May 1, 1786, Mozart was obliged to go to the emperor's box after the first act to inform him that several of the singers were singing false purposely, to prevent his success. The emperor put an end to these intrigues, and none of Mozart's successes was more triumphant. His opponents now plotted in secret to prevent its repetition, and it was given but nine times, when V. Martini's *Cosa rara*, with its light pleasing music, long ago forgotten, met with such a popular reception that the managers withdrew *Figaro* from the stage for the next two years. But in Prague it was received with so much applause that Mozart was induced to visit that city. His stay there was one of the happiest periods of his life, and he consented to prepare a new piece for the manager of the Prague opera, for which Da Ponte wrote his libretto of *Don Giovanni*. It was given first on Oct. 29, 1787, the overture being played without rehearsal from parts just from the pens of the copyists, Mozart not having written it out until the night before. On Nov. 3 it was sung for the fourth time and for the benefit of the composer. Just as Mozart reached Vienna again, Gluck died of apoplexy (Nov. 15), and the emperor, aware that the composer was only awaiting adequate proposals to go to London, at once appointed him one of his chamber musicians, a sinecure with a salary of 800 florins, which, though small, was higher than that of his colleagues. The report of the first performance of *Don Giovanni* had excited a desire in Vienna to hear it. It was performed May 7, 1788, but was coldly received. The emperor said to Da Ponte: "The opera is divine! perhaps finer than *Figaro*; but it is no food for the teeth of my Viennese." Da Ponte repeated this to Mozart. "Let them have time to chew upon it," said he. Da Ponte used his influence to have the performances of it follow each other as rapidly as possible, and the result was an astonishing success, as the audience gradually recognized the transcendent merits of the work. A new sphere of activity now opened for Mozart. Starzer, director of the great oratorio, died, and Mozart was engaged in his stead. In Handel's time the deficiencies of the orchestra were compensated by the organ; but, as the performances in Vienna took place in halls where there was no organ, it was necessary to supply its place with additional orchestral parts. Four of Handel's works were arranged by Mozart: "Acis and Galatea" (1788), "The Messiah" (1789), and "The Ode for St. Cecilia's Day" and "Alexander's Feast" (1790). Although he never worked harder than at this time, his pecuniary condition was becoming deplorable. He was

plundered of his labors by performers, and of his money by delinquent borrowers; but his fame was extending, and his works, notwithstanding their striking originality, were becoming more generally appreciated. In the spring of 1789 he became a travelling companion of Prince Charles Lichnowsky, and he gave performances in Dresden, Leipsic, and Berlin. The king of Prussia, Frederick William II., understood Mozart's music very well, and took such a liking to him as to offer him the place of chapelmaster with 3,000 thalers salary. Mozart refused the offer out of regard for the emperor Joseph, whereupon the king told him it should remain good for a year and a day. After an absence of three months he returned to Vienna, where his profits were soon absorbed by the illness of his wife. He now wrote a quartet for the king of Prussia, for which he received a gold box and 100 friedrichs d'or. He had as yet said nothing of Frederick William's offer; but, urged by his friends, he submitted to the emperor his needy condition and requested his dismissal. Joseph was unpleasantly surprised, and exclaimed: "What! you will leave me, Mozart?" Mozart was touched, and replied: "Your majesty, I throw myself upon your mercy, and will remain." His *Così fan tutte* was produced Jan. 26, 1790, and was running successfully when the emperor died, before he had increased the composer's salary. The new emperor Leopold II., hostile to his predecessor's favorites, declined his services; and he carried his spitefulness so far that when the musicians in Vienna played before the king of Naples, Mozart was not invited to take part. In the autumn he visited Frankfurt, Mentz, and Mannheim, on occasion of Leopold's coronation. In Munich he was invited to play before the king of Naples, upon which he wrote to his wife: "Very honorable to the court at Vienna that the king could only hear me in a foreign land!" He was still pressed for money, but fortune was turning. Soon after his return, John Peter Salomon came to Vienna to engage Haydn, and after him Mozart, for his London concerts. Early in the spring of 1791 an old acquaintance, Schikaneder, proprietor of a small theatre in Vienna, applied to him to compose music for a fairy play. The subject was the *Zauberflöte* ("Magic Flute"). Constanza Mozart was in Baden at the sulphur baths, and her husband while engaged upon this opera was thrown much into the society of Schikaneder, who led a dissipated life. With him and his companions the disappointed and harassed composer forgot his troubles, and for 10 or 12 weeks, the first and only time in his life, was induced to break in upon his abstemious habits. With the exception of those which relate to this short period, the stories unfavorable to his reputation which are current in musical literature are without foundation. On May 9 the magistrates of Vienna appointed Mozart adjunct and successor to the chapelmaster Hoffmann of St. Stephen's church, the

best musical position in Vienna, except the imperial chapelmasterships. In July a messenger unknown to Mozart (his name was Leutger) brought him an anonymous letter in which, after speaking warmly of the composer's genius, his terms for a requiem were demanded. Mozart gave them, and soon after the messenger returned and paid him 50 ducats (or according to some authorities 100) in advance. At this time he was so assiduously engaged on the "Magic Flute" that he could not carry out Da Ponte's suggestion of giving performances in London, and he was moreover suddenly called upon in August to compose an opera for the coronation of the emperor as king of Bohemia at Prague. But four or five weeks remained for the entire labor of composition and rehearsal of this, the *Clemenza di Tito*, one of Metastasio's texts. When they were about to leave for Prague, some one pulled Mme. Mozart's dress as she and her husband were entering the carriage. She turned, and recognized the man who had ordered the requiem. Mozart explained the necessity of the journey, and promised to complete it at once on his return. When he reached Prague but 18 days were left before the opera was to be given. But his pupil Süssmaier was so well acquainted with Mozart's style of composition, that his master could give the score into his hands after the vocal parts were written and the accompaniment sketched, to be filled out. In this manner the work was completed in time; but it was not received as his others had been, partly on account of the character of the libretto, and partly because the subject was scarcely fitted for the excitement of a coronation. The opera afterward became popular. In September Mozart returned to Vienna, sick and disappointed, to divide his time between the "Magic Flute" and the requiem. The opera was performed on the 30th of that month, Mozart directing. The audience remained cold to the end of the first act, but warmed up before the close, and the composer was called before the curtain. Its popularity increased with each performance. It was given 24 times in October alone. There is hardly another instance in the annals of the lyric stage where an opera possessed of so little dramatic action has become so universally popular. That Goethe wrote a second part to it is perhaps the greatest compliment that could be paid it. Mozart now applied himself to the composition of the requiem with all the force of his genius. He was unable to discover the name (a Count Walsegg) of him who had ordered it, and he began to fancy that there was something supernatural about it. The anxieties of the preceding year, possibly the change in his habits while under the influence of Schikaneder, and his labors on the "Titus," had brought his nervous system into a condition which required a long period of rest. But he persisted in work, although he fainted repeatedly while engaged on the "Magic Flute;" and the restless energy with which he labored

on the requiem daily enfeebled him. His wife became anxious, called a physician, and took away the score. He then imagined that some one had given him poison. In November he was so much better as to write a cantata for the masonic lodge to which he belonged, "Praise of Friendship;" but at this time a rheumatic inflammatory fever was epidemic in Vienna, and in Mozart's enfeebled condition it seized upon him. Inflammation of the lungs led to dropsy of the chest, and after two weeks' confinement to his bed he died. On the last day of his life he busied himself with the requiem, which he fancied he was composing for his own obsequies, but left it unfinished. The widow could not return the money which had been received for it, and she determined to have it completed from her husband's rough notes. Süssmaier, Mozart's pupil, had often conversed with him about the plan of the work, and as his hand had a remarkable similarity to that of his master, he undertook the task. He copied all that Mozart had written, and added the rest, consisting of the close of the *Lacrimosa*, the *Sanctus*, the *Benedictus*, and the *Agnus Dei*, save that to the words *Cum sanctis* he repeated the fugue of the *Kyrie*. When the messenger came for the requiem, this score was given him; and its authenticity as a manuscript from Mozart's hand was never suspected by Walsegg until it began to be discussed by the press. While Mozart lay sick, the Hungarian nobility secured to him an annual pension of 1,000 florins, and a musical association in Amsterdam a still higher annuity, for which he was to furnish certain compositions annually.—Mozart left more than 800 works for the pianoforte in all forms, variations on a simple theme, works for two pianofortes, and up through all gradations to the concerto, with full orchestra; for orchestral instruments of every kind, from solos to the grand symphony; there are even compositions for Franklin's harmonica, and a piece for a musical clock. Equally universal is he in vocal music, from songs and airs for every kind of voice, to the opera and church music in all its forms as employed in the Roman Catholic service. But it is not so much the quantity as the excellence of his music which excites the astonishment of the musician. This was owing not more to the greatness of his genius than to his profound studies, which from infancy to the close of his life never ceased. During the rehearsals of *Don Giovanni* at Prague, in a conversation with the chapelmaster Kucharz, he remarked, in reply to praises of the new work: "People err if they think my art has cost me no trouble; I assure you, my dear friend, no one has taken such pains with the study of composition as I. There is hardly a celebrated master in music whom I have not carefully, and in many cases several times, studied through." Several generations of musicians have been educated upon the works of Mozart. His ideas have become common stock; and effects which, if now introduced

into a composition, would sound hackneyed, were in his works the joint production of lofty genius and profound contrapuntal knowledge, guided and restrained by exquisite taste. As an instrumental composer perhaps one only has surpassed him, Beethoven; but Beethoven had perfected his genius by studying Mozart. Haydn had developed the quartet form and invented the grand symphony. Mozart gave them a new spirit, and one sees his influence in all Haydn's later works. That great master said to Mozart's father in 1785: "I tell you before God and as a man of honor, that I look upon your son as the greatest composer of whom I ever heard; he has taste, and possesses the most thorough knowledge of composition." The symphony in C with the fugue is alone sufficient proof of the correctness of Haydn's opinion; it is the greatest work of the kind ever written before Beethoven. But it was as an operatic composer that Mozart reached a height upon which, like Handel in oratorio, and Bach in his own contrapuntal sphere, and Beethoven in orchestral music, he stands superior to all his predecessors. Two musical institutions bear his name, the Mozarteum at Salzburg, and the Mozartstiftung in Frankfurt, and a monument was erected to him in the former city in 1852.—Among German works relating to Mozart are those by Niemetschek (1798), Röchlitz (1801), Arnold (1803), Nissen (1828), and Otto Jahn (4 vols., 1856-'9; new ed., 2 vols., 1869), the last of which is considered the best. The best French works on Mozart are by Fétis and Scudo. Several of the German works have been translated into French, and a publication in French by the Russian Ulibisheff (Moscow, 1841) has been translated into German (new ed. by Prof. Santler, 3 vols., 1873). In English, E. Holmes published a "Life of Mozart" (2 vols., London, 1865). Mozart's letters, edited by Nohl (1865; new ed., 1870), have been translated into English by Lady Wallace (2 vols., London, 1865). The earliest notice of Mozart in any language is by Daines Barrington in the "Philosophical Transactions" (1770). In 1874 the house in which Mozart composed the "Magic Flute" was removed to the Mirabellgarten in Salzburg, to be a repository of portraits and autographs of his eminent contemporaries and of musicians and poets of the present day.—KARL, the last surviving son of Mozart, attended the centennial celebration of his father's birth at Salzburg in 1856, and died in Milan, Oct. 31, 1858, leaving a large fortune.

MOZIER, Joseph, an American sculptor, born in Burlington, Vt., Aug. 22, 1812, died in Switzerland in October, 1870. He removed to New York in 1831, and was engaged in mercantile pursuits till 1845, when he retired from business, and shortly after visited Europe. Having devoted several years to the study of sculpture in Florence, he went to Rome, where he long resided. His principal works are a statue of Pocahontas, the "Wept of the Wish-ton-Wish," contributed to the in-

ternational exhibition at London in 1862, statues of "Truth" and "Silence" in the possession of the New York mercantile library association, "Rebecca at the Well," "Esther," a group illustrating the parable of the prodigal son, an "Indian Girl at the Grave of her Lover," and "Jephthah's Daughter."

MOZLEY, James Bowling, an English clergyman, born in Lincolnshire in 1813, died Jan. 4, 1878. He graduated at Oriel college, Oxford, in 1834, was elected fellow of Magdalen college, and became vicar of Shoreham, Sussex, in 1856. He was appointed Bampton lecturer in 1865, canon of Worcester in 1869, and regius professor of divinity and canon of Christ church, Oxford, in 1871. He published "A Treatise on the Augustinian Doctrine of Predestination" (1855); "Primitive Doctrine of Baptismal Regeneration" (1856); "Review of the Baptistical Controversy" (1862); "On Subscription to the Articles" (1863); and "On Miracles" (Bampton lectures, 3d ed., 1872).

MTZENSK, or **Mzensk**, a town of Russia, in the government and 35 m. N. E. of the city of Orel, on the Zusha; pop. in 1872, 13,373. It is the capital of a circle, contains 13 churches and two convents, and has a considerable trade in agricultural products.

MUCUS SÆVOLÆ. See **SÆVOLÆ**.

MÜCKE, Heinrich Karl Anton, a German painter, born in Breslau, April 9, 1806. He completed his studies in Berlin under Schadow, whom he accompanied to Düsseldorf, where he became in 1844 teacher of anatomy at the academy. In 1849 he was appointed professor and subsequently member of the academical senate, which offices he resigned in 1867. He visited Italy and England, and was employed in painting in the former country, and on designs for the "Art Journal" in the latter. Among his principal works are frescoes in the palace of Heltorf, near Düsseldorf, illustrating the life of Frederick Barbarossa, with Lessing and other artists; and a large fresco in St. Andrew's church at Düsseldorf. His fine frescoes for the Elberfeld town hall have been destroyed. Among his most celebrated oil paintings is "St. Catharine carried by Angels to Mount Sinai." His other works include "The Storming of Jerusalem by Godfrey of Bouillon," "The Crowning of the Virgin," "The Resurrection," and many etchings and designs for illustrated works.

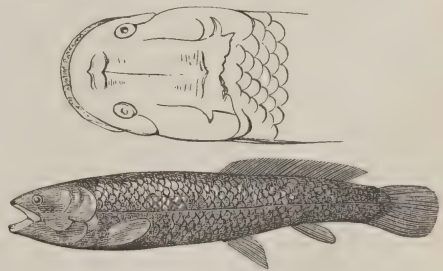
MUCOUS MEMBRANE. See **MEMBRANE**.

MUCUS, a transparent, colorless, and glairy or viscid fluid, exuded upon the free surface of the mucous membranes of the living body. It is the secretion of the numerous glandulæ or follicles with which these membranes are provided, and varies in the details of its composition and the degree of its viscosity with the particular region in which it is produced and the special function which it is destined to perform. It does not readily mix with water, but when agitated with that liquid is broken up into floating shreds or flakes, which are apt to become frothy from the entanglement of bub-

bles of air. It consists of water combined with a small quantity of the mineral salts, and a peculiar variety of animal or organic matter termed mucosine; to this last ingredient the glairy or viscid consistency of mucus is mainly due. The office of mucus is to lubricate the mucous canals and thus facilitate the passage of their contents, as in the mouth, œsophagus, and genito-urinary passages; to protect their surfaces from injury by desiccation, as in the nares, trachea, and bronchial tubes; or to take part in the chemical changes going on in their cavities, as in the small intestine. In the cervix uteri, during gestation, the mucus has so great a degree of viscosity as to be semi-solid like gum or strong paste; its office is to block up the cavity of the cervix uteri and prevent the escape or injury of the fœtus.

MUD EEL. See **SIREN**.

MUD FISH (*amia*, Linn.), a genus of American ganoids, found in the fresh waters of the United States. After it had been referred by ichthyologists to cyprinoid, salmonoid, and clupeoid fishes, Vogt discovered it to be a ganoid, having found in the muscular arterial trunk two oblique rows of five or six valves each and a spiral intestinal valve. Müller considers it the living representative of a ganoid family, like the fossil *megalurus*, *leptolepis*, and their congeners. The body is long and flexible, with a bony vertebral column; there are no spiny plates on the anterior border of the fins as in the gar fish, nor a series of separate dorsal fins as in *polypterus*; the mouth is trout-like, except in the absence of lingual teeth; there are two nasal cirri; the head is flat, and the bones under the very thin skin are sculptured plates; the large sublingual bone is naked and furrowed, the gill openings large, and the branchiostegal rays broad and flat, 11 or 12; tongue thick and fleshy; behind the conical teeth of the jaws are flat pavement-like ones; the scales are horny rather than osseous, flexible and rounded, yet presenting bone corpuscles of the same form and character as *lepidosteus* and other ganoids; the ventral fins are median, the single dorsal long, and the anal short; the



Western Mud Fish (*Amia occidentalis*).

caudal comes further forward above than below, rounded, giving an indication of the heterocercal tail. The larger air bladder is cellular and lung-like, communicating with the

cesophagus; no pancreatic cæca; ova dropping into abdominal cavity. Of about ten species, the best known is the western mud fish (*A. occidentalis*, De Kay), from 1½ to 3 ft. long; the back of the head is bluish black, the sides often obscurely spotted with olive, white below, and with a black spot at the upper edge of the caudal. It is found in the great northern lakes, south to Carolina, and west to the Mississippi; it is the bowfin of Lake Champlain, the dog fish of Lake Erie, and the marsh fish of the Canadians; it feeds on crawfish and other crustaceans, and is sometimes eaten by the Indians. This may include several species.

MUD HEN. See *Coor*.

MUDIE, Robert, a British author, born in Forfarshire, Scotland, in 1777, died in London in 1842. He was self-educated, and in 1802 was appointed professor of Gaelic and teacher of drawing in the Inverness academy. In 1820 he went to London, and was employed as a reporter on the "Morning Chronicle," but his career ended unhappily. He published a great number of popular works on natural history, astronomy, and other subjects, including "The British Naturalist" (2 vols., 1835), "Man, Social, Intellectual, Moral, Physical," "Hampshire," &c.

MUEZZIN (Arab. *mueddzin*, caller, proclaimer), an officer of a mosque who calls the faithful to prayer, as prescribed in the Koran, at dawn, near noon, in the afternoon, a little after sunset, and at nightfall, generally about an hour and a quarter after sunset. He stands upon the balcony of a minaret, and turning successively toward the four cardinal points chants in a loud voice: "God is great; I testify that there is no God but Allah; I testify that Mohammed is the prophet of God. Come to prayer; come to the temple of safety. God is great. There is no God but Allah." For the convenience of those who may desire to perform extra devotions, the muezzin chants the same words during the night, and at these times, immediately after the words "come to the temple of safety," he adds: "Prayer is better than sleep." According to an Arabic tradition, the office was instituted by Mohammed himself, and the words last quoted were added to the regular formula by the first muezzin on an occasion when the prophet overslept himself. Mohammed approved of them, and they were ever afterward retained in the nightly call. As the lofty position of the muezzin enables him to overlook the roofs and balconies of the neighboring private houses, on which the women often pass their time, it has long been the custom to confer the office only on blind men; and stories abound in the East of men feigning blindness in order to secure it. Purity of morals, acquaintance with the Koran, and a strong and pleasant voice are also regarded as indispensable qualifications.

MUFTI (Arab., one who expounds the law), a doctor of the law of the Koran who performs certain religious and civil functions. There is

one in every large town of the Ottoman empire. In his religious capacity he manages the property of the church and watches over the due observance and preservation of its rites and discipline. In his civil capacity he pronounces decisions in such matters of dispute as may be submitted to him. He has no power to enforce his decision, but if it is not voluntarily conformed to by the parties, it has great weight before any other tribunal to which they may appeal. Matters of police, disputes between families, and generally questions involving private interests of no great importance, are decided by the mufti without the intervention of advocates or any legal expense. According to tradition, his decisions should be given in the fewest words without assigning any reasons; if possible, it should be simply "Yea" or "Nay." The mufti of Constantinople, or grand mufti, called also *sheikh ul-Islam*, "chief of Islam," is the highest religious authority of the empire. He is appointed by the sultan and can be deposed by him, but the sultan cannot sentence the grand mufti to death nor confiscate his property. The grand mufti ranks next to the grand vizier; he is the chief interpreter of the law, and his authority and influence, though merely advisory, were formerly very great. Of late years the practical importance of the office has greatly declined.

MÜGGE, Theodor, a German author, born in Berlin, Nov. 8, 1806, died there, Feb. 18, 1861. He abandoned commercial life to enlist in the army, and was about to join Bolivar in Peru when the news of the expulsion of the Spaniards reached him in London. He then studied in the university of Berlin, published *Bilder aus dem Leben* (1829), and after losing by his political pamphlets in 1830 all chance of receiving a public office, he began to publish tales, novels, and narratives of travel. A complete edition of his works appeared in 23 volumes in 1862-'7. The most notable are: *Toussaint Louverture* (1840); *Die Schweiz* (1847; English translation by Mrs. Percy Sinnet, London, 1848); and his novels delineating Scandinavian life, *Afraja* (1854; English translation by Edward Joy Morris, Philadelphia, 1854; French, Paris, 1857), *Erich Randal* (1857), and *Leben und Lieben in Norwegen* (1858).

MUGGLETON, Ludowick, an English fanatic, who in conjunction with John Reeve founded the sect of the Muggletonians, born in 1609, died March 14, 1697. He was a tailor, and in 1651 proclaimed himself and Reeve the "two last witnesses" mentioned in the Apocalypse, and armed with power to prophesy and to punish men. Muggleton professed to be the "mouth" of Reeve, as Aaron was of Moses. They began their mission by denouncing all religious sects, especially Ranters and Quakers. In 1656 appeared an exposition of their doctrines under the title of "The Divine Looking Glass." They held that God has the body of a man, that there is no distinction of persons in the Trinity, and that God, descending to earth

and suffering on the cross, left Elias as his vicergerent in heaven during his absence. They were attacked by William Penn in a book called "The New Witnesses proved Old Heretics." Muggleton was arraigned at the Old Bailey for blasphemy in 1676. The first complete edition of his works was published in 1756. In 1832 another edition appeared in 3 vols. 4to, including his rhapsodies and those of Reeve, with several tracts by others.

MÜHLBACH, Luise. See MUNDT, KLARA.

MÜHLBERG, a town of Prussia, in the province of Saxony, on the right bank of the Elbe, 40 m. S. E. of Wittenberg; pop. about 3,500. It is memorable for the victory obtained here, April 24, 1547, by the emperor Charles V. over the elector of Saxony, John Frederick, which terminated the war of the Smalcald league, the elector himself being taken prisoner. The Protestant cause in Germany was completely prostrated, but the fruits of his victory were lost to the emperor by the defection in 1552 of Maurice, the new elector of Saxony.

MÜHLDORF, Battle of. See AMPFING.

MUHLBERG. I. Peter John Gabriel, an American general, son of Henry Melchior Muhlenberg, the founder of the German Lutheran church in America, born at Trappe, Montgomery co., Pa., Oct. 1, 1746, died near Philadelphia, Oct. 1, 1807. He was ordained to the ministry in England, and preached at Woodstock, Va. His last sermon was upon the duties men owe to their country; and saying, "There is a time for all things, a time to preach and a time to fight, and now is the time to fight," he stripped off his gown after the service, put on a uniform, read his commission as colonel, and formed a regiment among his parishioners. He was made brigadier general in 1777, and major general at the close of the revolution. After the war he removed to Pennsylvania, where he was elected a member of the supreme executive council, and in 1785 became vice president of the commonwealth. He was a member of congress in 1789-91, 1793-5, and 1799-1801. In 1801 he was elected United States senator, but resigned the next year, and was appointed supervisor of the revenue for the district of Pennsylvania. From 1803 till his death he was collector of the port of Philadelphia. His life has been written by H. A. Muhlenberg (Philadelphia, 1849). **II. Gotthilf Henry Ernst**, an American clergyman and botanist, brother of the preceding, born in New Providence, Montgomery co., Pa., Nov. 17, 1753, died in Lancaster, May 23, 1815. At the age of 10 he was sent to the university of Halle. In 1770 he returned to America, and in 1774 became assistant to his father, then pastor of the Lutheran congregation in Philadelphia. In 1780 he became pastor of the church at Lancaster. He was a member of the American philosophical society, of the *Gesellschaft naturforschender Freunde* in Berlin, of the philosophical and physical societies of Göttingen, and of various

other associations in Germany and Sweden. His chief works are: *Catalogus Plantarum Americae Septentrionalis* (Lancaster, 1813), and *Descriptio Ueberior Graminum*, &c. (1817). **III. William Augustus**, an American clergyman, great-grandson of Henry Melchior Muhlenberg, born in Philadelphia, Sept. 16, 1796, died in New York, April 8, 1877. He graduated at the university of Pennsylvania in 1814, was ordained in the Protestant Episcopal church in 1817, and became assistant in Christ's church, of which Bishop White was rector. In 1821 he accepted the rectorship of St. James's church, Lancaster, where he was instrumental in establishing the first public school in the state out of Philadelphia. He founded in 1828 a school at Flushing, L. I., which was afterward known as St. Paul's college, and for nearly 20 years was its principal. In 1846 he became rector of the church of the Holy Communion, New York, which was erected by his sister, and was the earliest free Episcopal church. Not long afterward he began his efforts to secure the founding of St. Luke's hospital, which was erected in Fifth avenue and 54th street, and opened in 1858, Dr. Muhlenberg becoming its first pastor and superintendent, which post he still holds (1875). In 1845 he organized the first Protestant sisterhood in the United States, and the ladies of this association are in charge of St. Luke's hospital. He has also, within the past few years, made an effective beginning toward establishing an industrial Christian settlement at St. Johnland, Long Island, about 45 m. from New York. He is the author of the well known hymn, "I would not live alway," and of other poems, has published "Church Poetry, being Portions of the Psalms in Verse and Hymns suited to the Festivals and Fasts, from various authors" (1823); in conjunction with Bishop Wainwright, "Music of the Church" (1852); and "The People's Psalter" (1858). He originated the famous memorial movement in the Episcopal church, and has written much on evangelical catholic union.

MUHLBURG, a W. county of Kentucky, bounded N. E. by Green river and W. by Pond river, its principal branch; area, 430 sq. m.; pop. in 1870, 12,638, of whom 1,633 were colored. The surface is hilly and the soil generally fertile. It contains coal and iron mines near Green river. The Elizabethtown and Paducah railroad passes through it. The chief productions in 1870 were 36,544 bushels of wheat, 364,513 of Indian corn, 86,880 of oats, 1,821,988 lbs. of tobacco, 27,091 of wool, 76,389 of butter, and 2,615 tons of hay. There were 2,985 horses, 1,290 mules and asses, 2,961 milch cows, 4,024 other cattle, 13,959 sheep, and 17,830 swine. Capital, Greenville.

MÜHLHAUSEN, or *Mülhausen* (Fr. *Mulhouse*), a town of the German Reichsland of Alsace-Lorraine, in the district of Upper Alsace, on the Ill, 19 m. N. W. of Basel and 62 m. S. S. W. of Strasburg; pop. in 1871, 52,825, since which it

has considerably increased by immigration from Germany. It consists of an old and a new town, the former on an island, the latter on the right bank of the Ill. Since the beginning of the present century it has been an important seat of industry. Cotton printing was introduced here about the middle of the 18th century, and is largely carried on; and recently the manufacture of woollen goods has assumed great importance. The town with its territory once formed part of the Swiss confederation, but was united to France in 1798. It was occupied by the Germans in September, 1870, and by the treaty of May, 1871, was ceded to Germany.

MÜHLHAUSEN, a town of Prussia, in the province of Saxony, on the Unstrutt, 29 m. N. W. of Erfurt; pop. in 1871, 19,516. It has a gymnasium, 14 churches, three hospitals, and an orphan asylum. The principal manufactures are linens, woollens, leather, and tobacco. It is surrounded by walls, and was formerly a free city of the empire. It is memorable as the headquarters of Münzer, the leader of the peasants' war, and the scene of his execution in 1525.

MÜHLHEIM-ON-THE-RHINE, a town of Rhenish Prussia, on the Cologne and Minden railway, 2 m. N. of Cologne; pop. in 1871, 13,511. It has a Catholic and two Protestant churches, a synagogue and a pro-gymnasium. The industry is very flourishing; the chief manufactures are velvet, silk, and leather. There are also numerous mills, and a brisk trade by river and railway. Its prosperity dates from the beginning of the 17th century, when some Protestant emigrants from Cologne settled here.

MÜHLHEIM-ON-THE-RUHR, a town of Rhenish Prussia, 35 m. N. of Cologne; pop. in 1871, 14,267. It has a Catholic and a Protestant church, a *Realschule*, and a school of weaving. There are important manufactories of woollen and linen cloth, of paper, tobacco, soap, and starch, and a large cotton mill. Many vessels are built here for the navigation of the Rhine and the Ruhr, which here becomes navigable and is crossed by a chain bridge. An important trade is carried on in coal, large quantities of which are shipped to Holland, and in building materials.

MUIR, John, a British orientalist, born in Glasgow in 1810. He was educated in the university of Glasgow and in the school of the East India company at Haileybury, and was employed in the civil service in British India from 1828 to 1853. He gave £5,000 to the university of Edinburgh for the endowment of a chair of Sanskrit and comparative philology, and has greatly promoted the diffusion of Christianity among the Hindoos. His principal work is "Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions" (5 vols., London, 1858-'70).—His brother, Sir **WILLIAM MUIR** (born in 1819), became governor of the North-western Provinces of India in 1868.

MULATTO. See **NEGRO**.

MULBERRY, a name, the derivation of which is obscurely traced to *morus*, the Latin name of a genus of trees which some botanists place in a division of the nettle family (*urticaceæ*), while others make an order *moreæ* for this, the fig, the breadfruit, and a few other related genera. The mulberries are trees with rounded leaves, a milky juice, and monœcious or diœcious flowers in small axillary spikes; the flowers are apetalous, the sterile consisting of a four-parted calyx and four stamens; the fertile with a similar calyx and a two-celled ovary with two styles; in ripening, one of the cells of the ovary disappears, and the fruit proper is one-seeded; it is surrounded by the calyx, which in ripening becomes fleshy and berry-like, and the whole fertile spike, crowded with the ripened calices, becomes edible.—The red mulberry (*M. rubra*) is found from New England southward; it is usually a small tree 15 to 30 ft. high, but in some localities it reaches 60 or 70 ft., forming a handsome head; its leaves are heart-ovate, serrate, rough above, downy beneath, and on young shoots often lobed; the flowers are frequently diœcious; the fruit is about an inch long, dark purple, and pleasant to the taste. This native species has been singularly neglected; it is a handsome ornamental tree, and produces an acceptable fruit, which, to judge from what has been done with other species, may be greatly improved; but its chief value is in the excellent quality of its timber, which is of a yellowish color, strong, compact, and regarded as equal in durability to that of the locust; it is used in ship building as a substitute for locust in treenails, and for the light timbers of vessels and boats, for which use it is in the southern



Black Mulberry (*Morus nigra*).

states preferred to any wood except the red cedar.—The black mulberry (*M. nigra*), probably originally from Persia, has been known from very early times, and it is believed that

the mulberry mentioned in the Scriptures was this species; it has long been cultivated in England, as it is mentioned by Tusser in 1557; Shakespeare had a favorite tree of this species in his garden at Stratford, and from this Garrick raised two trees which were standing a few years ago. There are several instances recorded of the longevity of this tree; those at Syon House, the residence of the duke of Northumberland, can be traced back more than three centuries. Not only is the tree long-lived, but exceedingly tenacious of life; it is stated in the *Annales des sciences naturelles* that a root sent up shoots after lying dormant in the ground for 24 years. This species is not hardy in a climate more severe than that of the city of New York. It seldom grows more than 30 ft. high, is much branched, and has heart-shaped, rough leaves; its fruit is much larger and finer than that of our native species, being an inch and a half long and an inch thick; when ripe the fruit falls spontaneously, and it is customary to plant the tree in grass so that the fruit may be kept clean; the seeds of cress or other fine-leaved annuals are sown around the tree when it stands in bare ground, to form a mat to receive the fruit. In England the mulberry is a popular dessert fruit, and it is used to form a sweetmeat and a sirup; its juice is mixed with that of apples to form mulberry cider. The wood of this species is of little value except for fuel.—The white mulberry (*M. alba*) is a native of China, and has become naturalized in the older portions of this country. It is readily distinguished by its obliquely heart-shaped, somewhat lobed leaves, which are smooth and shining, and by its generally yellowish white fruit, which is mawkishly sweet and without flavor. While silkworms will feed upon the leaves of other species, none produce silk of so fine quality as those kept upon the leaves of the white mulberry. This species was introduced into Europe by the way of the Levant in 1434. The variety of this, with smaller stems and more abundant leaves, called *M. alba multicaulis*, is preferred in the silk-growing countries to any other. The remarkable excitement caused by the introduction of this variety into the United States 30 or 40 years ago is still within the recollection of many; hundreds of people were engaged in raising mulberry trees for sale, with the expectation of a handsome fortune; but as unfortunately there were no buyers, the speculation subsided as suddenly as it arose. A seedling of the multicaulis is Downing's ever-bearing mulberry, which originated with Mr. Charles Downing at Newburgh, N. Y.; the tree is very productive and remains in bearing a long time; the fruit is nearly as large as that of the black mulberry, which it resembles in flavor; it is maroon-colored or blue-black at maturity. Although the fruit of the multicaulis is white, it has produced several dark-colored seedlings besides this. Hicks's ever-bearing mulberry, which originated in

Kentucky, produces an immense quantity of sweet and insipid fruit for four months; in the southern states it is planted in poultry yards to afford the fowls both shade and food.



Paper Mulberry (*Broussonetia papyrifera*).

—The paper mulberry belongs to another genus of the same family, *Broussonetia*, named in honor of a French naturalist, Broussonet; three species have been described, but they are probably all forms of one, *B. papyrifera*, which grows wild in Japan, China, and many of the islands of the Pacific. It is a small quick-growing tree, 20 or 30 ft. high, with leaves very variable in shape; upon the older branches they are ovate or heart-shaped, but those upon vigorous shoots, or suckers that spring up from the roots, are so much lobed and cut that one would hardly think they could belong to the same tree with the others; they are all rough above and downy beneath. This species is truly dioecious, the staminate trees being much more numerous than the fertile; the sterile flowers are in cylindrical catkins much like those of the mulberry, while the fertile are crowded in a round head about the size of a marble; they consist of a three- or four-lobed calyx, out of which the ripened ovary protrudes as a club-shaped, pulpy fruit, which is scarlet, sweetish, and insipid. This has long been cultivated in New York and southward as a shade tree, but elsewhere than in paved streets it becomes a nuisance on account of the great abundance of suckers it produces. It is fortunate that the fruit-bearing trees are rare, as in streets the abundant pulpy fruits fall and keep the walk in an unpleasant condition. The Japanese cultivate this tree to furnish material for their paper; the tree is kept cut back to produce an abundance of young shoots; these, in pieces of convenient size, are boiled to separate the bark, which is then peeled off and dried for use. The bark is converted into paper by

scraping off all extraneous matter, and boiling in ley until its fibres separate; it is then beaten with wooden sticks, and the pulp thus obtained is mixed with mucilage and spread upon frames of rushes to dry. The so-called India paper, used by engravers to take proofs of their work, is also prepared from this bark. In the South sea islands the bark is used to make tapa, which serves the natives as a substitute for cloth; the bark is soaked for a long time and then beaten to the requisite thinness by the use of a square stick of hard wood, the sides of which are sharply creased; the cloth, which is made into garments, is used plain or stamped with rude figures in various colors. The tree is propagated from cuttings made of the root.—Mulberries are propagated by seeds, cuttings, and layers; they grow readily from seeds which are sown in early spring. The black mulberry is grown from cuttings, the multicaulis variety by both cuttings and layers. Downing's ever-bearing is propagated by grafting upon roots of the white mulberry.

MULDER, Gerardus Johannes, a Dutch chemist, born in Utrecht, Dec. 27, 1802. He studied at the university of Utrecht, and became a physician in Amsterdam. In 1827 he was appointed lecturer on botany and chemistry in the medical school of Rotterdam, resigned in 1830, and in 1840 became professor of chemistry at Utrecht. His chief work, translated from the Dutch into German by Kolbe, and into English by Fromberg, is "Chemistry of Vegetable and Animal Physiology" (edited by J. F. W. Johnston, Edinburgh, 1849). In this he deduces as the result of original inquiries the existence in animals of a substance which he calls "proteine," which they derive ready formed from plants. This discovery involved Mulder in a controversy with Liebig, who from the difficulty of obtaining it doubted the existence of proteine as an independent compound. Among his other works are "Chemical Researches" (1847), "The Chemistry of Wine" (edited by H. Bence Jones, London, 1857), "The Chemistry of Beer" (1856), and "The Chemistry of the Vegetable Mould" (3 vols., 1861-'4), all of which have been translated into German.

MULE. See Ass.

MULE DEER. See DEER.

MULGRAVE, I. Constantine John Phipps, lord, a British navigator, born May 30, 1744, died in Liège, Belgium, Oct. 10, 1792. His father was raised to the Irish peerage as Baron Mulgrave in 1767. He early entered the navy, commanded a northeast arctic exploring expedition in 1773, and returned the same year, having reached lat. 80° 48', beyond which an impenetrable field of ice stretched as far as could be seen. He was afterward commissioner of the admiralty, and in 1790 was created Baron Mulgrave in the British peerage. He published a "Journal of a Voyage toward the North Pole" (London, 1774).

II. Henry Phipps, first earl of Mulgrave and

Viscount Normanby, brother of the preceding, born Feb. 14, 1755, died April 7, 1831. He served in the British army during the American war of independence. On his brother's death the English barony became extinct; but he succeeded to the Irish title, became a member of Mr. Pitt's administration, and was noted for his opposition to Roman Catholic emancipation. In 1807 he was made first lord of the admiralty, and in 1812 was created earl of Mulgrave and Viscount Normanby. (See NORMANBY.)

MULGRAVE, John Sheffield, earl of. See BUCKINGHAM, or BUCKINGHAMSHIRE, DUKE OF.

MULGRAVE (or Mille) ISLANDS, a group in the southern part of the Radack chain, which forms the eastern part of the Marshall or Mulgrave archipelago in the N. Pacific ocean. Their extent is not very well determined, but the surrounding reefs have been examined for about 40 m., and only one pass for ships and another for boats could be found. Some of the islands are mere coral rocks submerged at high tide, but nearly all have deep water close to the reefs. When they reach the level of the water they become, like the islands already formed, covered with sand and vegetation. Some of them are of considerable size, and have clumps of coconut and breadfruit trees.

MULHOUSE. See MÜHLHAUSEN.

MULL, an island of the Hebrides, forming part of Argyleshire, Scotland, in the Atlantic ocean, and separated from the mainland by a narrow strait called the sound of Mull; area (including that of the surrounding islets), 301 sq. m.; pop. in 1871, 5,947. The coast is rocky, and deeply indented. The surface is mountainous, Benmore, its highest summit, attaining an altitude of 3,168 ft. The most remarkable natural objects are the caverns and basaltic columns and arches around its shores. The soil is chiefly devoted to pasturage. Herring and white fish are caught off the coasts. Mull contains several villages. Tobermory, near the N. E. extremity, is the most important.

MULLEIN, the common name of *verbascum thapsus*, said to be derived from the Latin *malandrium*, a disease like leprosy, applied to this plant on account of its having been used for this and similar diseases in cattle. It is a common and troublesome plant in cultivated grounds and by roadsides in the older parts of the United States. The genus includes more than 80 species, which are widely distributed; it belongs to the family of figworts or *scrophulariaceæ*, and differs from most others of the family in having an open, wheel-shaped corolla. The common mullein is a biennial with radical leaves 6 to 12 in. long, oblong-acute, those of the stem smaller and decurrent at the base, forming wings upon the stem; the leaves and the stem, which is 4 to 6 ft. high, are clothed with a dense woolly pubescence, which gives the plant a hoary appearance; the flowers are collected in a dense spike, a foot or more long, the bright yellow corolla nearly equally five-

lobed; stamens five, the upper three with bearded filaments; the fruit a thick, ovoid, two-celled capsule, containing numerous small seeds. The plant is found all over Europe and



Common Mullein (*Verbascum thapsus*).

the temperate parts of Asia, and has long been naturalized in this country. Were it not a weed, the mullein would be valued as an ornamental plant, as a single well grown specimen is a stately object; but its chief importance is as a weed, and its presence indicates slovenly culture. Although it so abundantly seeds the ground, it is not difficult to eradicate if taken while young. The leaves have a mucilaginous and bitter taste, and slight narcotic properties, and have long been used in domestic medicine to allay coughs and other irritations, and externally as an emollient application to tumors, piles, &c.; on account of its use in diseases of cattle, one of its common names in England is bullock's lungwort. The down upon the leaves, when perfectly dry, makes a good tinder; the same substance served the ancient Greeks for lamp wicks, and the Romans dipped the stalks in suet to make funeral torches. High taper and hig or hag taper are old English names for the plant, and refer to its use in the incantations of witches.—Moth mullein (*V. blattaria*) is less common than the other, and more abundant in the eastern states than elsewhere; it is from 2 to 4 ft. high, with leaves and stem smooth and green; the flowers are in a leafy raceme, and yellow, or white with a tinge of purple; the filaments of the stamens are all bearded with violet-colored wool, which gives to the very ephemeral flowers no little beauty. This is also an introduced plant, having abroad an equally wide range with the preceding, and is of no other importance than as a weed for the farmer to get rid of.—The white mullein (*V. lychnitis*) is of rare occurrence in Pennsylvania and New York; its stem and leaves are clothed with a thin, powdery pubescence, and its yellow flowers (only rarely white)

are in a pyramidal panicle. It is also from Europe, where as well as here it hybridizes with the common mullein, and produces some puzzling intermediate forms.—Some species rank as ornamental plants, including *V. Chaixii* from the Pyrenees, which, unlike the others, is perennial; its abundant flowers are yellow, with a violet throat, and arranged in a large pyramidal panicle.

MÜLLENHOFF, Karl Victor, a German philologist, born at Marne, Holstein, Sept. 8, 1818. He studied in Berlin, and graduated in 1837 at Kiel, where he became professor of the German language and of ancient history. In 1858 he was transferred to the university of Berlin. His writings relate mainly to early German literature and philology, and include *Altdeutsche Sprachproben*; *Denkmäler deutscher Poesie und Prosa aus dem 8. bis 12. Jahrhundert*, with Scherer (Berlin, 1864); and *Deutsche Alterthumskunde* (1870).

MÜLLER, Charles Louis, popularly known as Müller de Paris, a French painter, born in Paris, Dec. 22, 1815. He studied under Cogniet and Gros, and in the school of fine arts, and in 1837 exhibited his first picture, "Christmas Morning." From 1850 to 1853 he was director of the manufacture of Gobelin tapestry, and in 1864 he succeeded Flandrin in the academy of fine arts. Among his principal works are "The Martyrdom of St. Bartholomew," "The Massacre of the Innocents," "Primavera," and "The Appeal of the Victims of the Reign of Terror." The last, his masterpiece, contains portraits of the most illustrious victims. In 1855 he exhibited a large painting, *Vive l'empereur*, illustrating a poem by Méry, representing an episode in the battle before Paris, March 30, 1814, which gained for him a medal of the first class. Among his later works are "Desdemona" (1868), and "Languisais at the Tribune" (1869).

MÜLLER, Friedrich, a German painter and poet, born in Creuznach in 1750, died in Rome, April 23, 1825. He early devoted himself to painting and copperplate engraving, and in his 18th year published several collections of etchings, which attracted much attention from their originality. In 1776 he went to Rome, and studied the works of Michel Angelo; but his taste for the grotesque constantly increased and gave a fantastic character to his productions. He was chiefly known as a guide in Rome, where he was called Müller the painter. He succeeded better as an author than as an artist, writing idyls, romances, ballads, and dramas. His best drama is *Niobe*. A complete edition of his works has been published (3 vols., Heidelberg, 1811; 2d ed., 1825).

MÜLLER, Friedrich, a German philologist, born at Jemnik, Bohemia, March 5, 1834. He completed his studies in Vienna from 1853 to 1857, and was employed as a librarian there from 1858 to 1866, when he became extraordinary and in 1869 ordinary professor of comparative philology and of Sanskrit at the uni-

versity, and a member of the academy of sciences. Benfey regards him as the highest authority on comparative philology and ethnology, and he has written extensively on these subjects for periodicals. His principal works are: *Reise der österreichischen Fregatte Novara: Linguistischer Theil* (Vienna, 1867), and *Ethnographischer Theil* (1868); and *Allgemeine Ethnographie* (1873).

MÜLLER, Friedrich Max, an English philologist, son of the poet Wilhelm Müller, born in Dessau, Germany, Dec. 6, 1823. He commenced his philological studies in Leipsic, where he took his degree in 1843. Induced by Hermann Brockhaus to give special attention to Sanskrit, he published in the following year his first work, a translation of the *Hitopadeśa*, a collection of Hindoo fables. After attending the lectures of Bopp and Schelling in Berlin, and examining the collection of Sanskrit manuscripts then purchased by the government, he went to Paris, where he prepared himself, at Burnouf's suggestion, to undertake the editing of the *Rig Veda* with the Sayana commentary. For the purpose of comparing the manuscripts of the Louvre with those in the possession of the East India company and those contained in the Bodleian library, he went in 1846 to England, where Bunsen and Wilson induced him to remain, and the East India company assumed the expense of the publication of his edition of the *Rig Veda*. The first volume of this stupendous work appeared in 1849, and the sixth and last at the end of 1874. Each volume consists of more than 1,200 pages. This edition has a special value from the masterly introductions prefixed to the volumes, which form important additions to the science of Indian antiquities and linguistics. The first volume of a second edition of the *Rig Veda*, without the Indian commentary, was published at Leipsic in 1856. He has published in German an excellent translation of Kalidasa's *Meghadūta* (Königsberg, 1847), a charming novel entitled *Deutsche Liebe* (Leipsic, 1857; English translation, Chicago, 1875), and several articles in philological journals; but most of his publications are in English. After a series of essays on the modern dialects of India, which appeared in the "Transactions of the British Association" and literary journals in England, he issued in 1854, on the occasion of the Crimean war, a treatise entitled "Suggestions on learning the Languages of the Seat of the War in the East." After the publication of "Proposals for a Missionary Alphabet" appeared his "History of ancient Sanskrit Literature" (1859), which has passed through several editions. The greatest success, however, has attended his "Lectures on the Science of Language," delivered at the royal institution of Great Britain in 1861 and 1863 (2 vols., London, 1861-'4), in which he shows in a popular style the bearing of the science of language on some important problems of philosophy and religion. His "Handbooks for the Study of Sanskrit,"

of which the first volume was published in 1865, are held in high esteem. They comprise a Sanskrit grammar and dictionary, and an edition of the text of the *Hitopadeśa* with a Latin transcription, an interlinear translation, and grammatical notes. In the years 1867-'70 appeared several volumes of his essays, first published in periodicals, under the title of "Chips from a German Workshop," on subjects pertaining to the science of religion, mythology, and the history of literature. In 1870 he delivered a course of lectures introductory to the science of religion, which produced considerable discussion in Europe and America. When they were published he added two essays on "False Analogy" and "The Philosophy of Mythology." He lectured in 1872 before the newly inaugurated university in Strasburg, and in 1873 in Westminster abbey, which led to remonstrances on the part of the orthodox clergy. Having settled in 1848 in Oxford, where his edition of the *Rig Veda* was to be printed, he was invited by the university to give courses of lectures on comparative philology as deputy Tylorian professor. Though once defeated as candidate for a professorship of Sanskrit, a new professorship of comparative philology was founded in 1868, with his name in the statute as the first incumbent. He has been since 1865 director of the oriental department of the Bodleian library, and in 1874 he presided over the Aryan section of the first international oriental congress.

MÜLLER, George, an English philanthropist, born at Kroppenstädt, Prussia, Sept. 27, 1805. He graduated at Halle, went to England in 1829, and in 1830 was settled as pastor over a small Independent chapel at Teignmouth. In a few months he relinquished his salary, believing that God would supply his wants in direct answer to prayer. In 1832 he became pastor at Bristol, refusing all salary except voluntary offerings. He established a free breakfast for all poor persons who would listen to religious reading while eating; but this was discontinued because the neighbors objected to the presence of so many beggars. In 1833 he opened two day schools, and before the end of the year had four schools in operation. In 1836 he determined to establish an orphanage, and hired a house for that purpose. By June, 1837, he had received £1,000 for his orphans, and considerable sums for other benevolent purposes. In 1838 he hired three houses, and supported 86 orphans. In 1842 he had ten schools and 96 orphans. In 1845 he determined to erect a building sufficient for all orphans that should be sent to him, and began to pray for £10,000, besides current expenses. In December a donation of £1,000 was sent to him; in July, 1846, he received a donation of £2,050; and up to January, 1847, he had received £9,284 besides current expenses. In 1850 the large orphan house was built and furnished at a cost of £15,000, and was im-

mediately filled with 300 orphans. At this time his annual receipts for all his enterprises amounted to £8,000, all of which he says was received in direct answer to prayer, without application to a single person. Praying for still more funds, he received in January, 1851, a gift of £3,000; in March, 1852, one of £1,000, and another of £500; in the spring of 1853 one of £8,100, and in the autumn one of £5,200. Believing it wrong to run in debt, he laid all these aside until he should have enough to finish one building. In May, 1856, he had accumulated £29,297, and began to build; and by May, 1860, he had received £45,000 for his building fund alone. In March, 1862, two more houses had been built and furnished, and were occupied by 700 orphans, making 1,000 supported by him, besides numerous schools and other benevolent undertakings. His three houses being full, he began to pray for funds to build two more. These were finished in 1870, when the five houses contained 2,050 children, besides teachers and attendants. During the year ending May 26, 1874, he received £37,855 15s. 6d., with which 189 missionaries and 122 schools were supported in whole or in part, 2,261 orphans maintained, and 47,413 Bibles or parts of the Bible and 3,775,971 tracts and books distributed. Between October, 1830, and May, 1874, he had received in all £617,000, by which 38,800 children had been taught in schools in Great Britain, Spain, Italy, India, and British Guiana; 467,000 Bibles and Testaments had been distributed, 50,000,000 tracts circulated, 190 missionaries supported year by year, and 4,408 orphans brought up. The orphans, after being educated, are put out to service or apprenticed to trades. The five orphan houses, erected at a cost of £115,000, are vested in a board of trustees; but they have no endowments, as their founder believes that funds will be provided as required. He is also pastor of a church of 900 members, built up by his own labors.

MÜLLER, Gerhard Friedrich, a Russian historian, born at Herford, Westphalia, Oct. 18, 1705, died in Moscow in October, 1783. He studied at Leipsic, became in 1725 a teacher in St. Petersburg, and in 1730 was appointed professor of history. In 1733 he accompanied Gmelin and De Lisle de la Croyère to Siberia, and returned in February, 1743, having spent the interval in studying the geography and antiquities of that country. In 1747 he was appointed historiographer of the Russian empire, in 1754 secretary of the academy of sciences, in 1766 keeper of the archives at Moscow, and afterward councillor of state. He is best known by his *Sammlung Russischer Geschichte* (9 vols., 1732-'64). His other writings include *Histoire des voyages et découvertes des Russes* (2 vols., Amsterdam, 1766). He has been called the father of Russian history, wrote French, Latin, Russian, and German with equal ease, and was the first to found a literary journal in the Russian language.

MÜLLER, Johann. See REGIMONTANUS.

MÜLLER. I. Johann Gotthard von, a German engraver, born at Bernhausen, near Stuttgart, May 4, 1747, died in Stuttgart, March 14, 1830. He prepared himself for the church, but attended at the same time the academy of fine arts. He studied engraving in Paris, where he remained from 1770 to 1776, when he was admitted to the French academy of fine arts, and was appointed by Duke Charles to found a school of art at Stuttgart, which under his guidance produced many excellent artists. Among his best prints are the "Battle of Bunker Hill," after Trumbull's picture, Raphael's *Madonna della Seggiola*, St. Catharine after Leonardo da Vinci, and a portrait of Louis XVI. **II. Johann Friedrich Wilhelm**, son of the preceding, born in Stuttgart in 1782, died near Dresden, May 3, 1816. After a careful training under his father he completed his studies in Paris, where besides other works he executed engravings of "St. John" and "St. Cecilia" after Domenichino. After preparing in Rome for the engraving of Raphael's *Madonna di San Sisto*, he devoted the remainder of his life to that masterpiece, his reproduction of which is one of the finest achievements of the art. In 1814 he was appointed professor in the academy at Dresden, but his health being impaired by overwork, he retired. He engraved in all only 18 plates.

MÜLLER, Johann Heinrich Jakob, a German physicist, born in Cassel, April 30, 1809, died Oct. 3, 1875. He studied in Darmstadt, Bonn, and Giessen, taught at Darmstadt, and in 1844 was appointed professor of physical sciences at Freiburg, Baden. His principal work, *Lehrbuch der Physik und Meteorologie* (2 vols., Brunswick, 1842; 7th ed., 1868-'9), was originally a version of Pouillet's *Éléments de physique*; and he published a supplement to it, *Lehrbuch der kosmischen Physik* (1856; 3d ed., 1872). Among his other works are: *Grundriss der Physik und Meteorologie* (1846; 10th ed., 1869-'70; with two supplements); *Grundzüge der Krystallographie* (1845; 2d ed., 1869); *Die constructive Zeichnungslehre* (2 vols. 1868); and *Anfangsgründe der geometrischen Disciplin für Gymnasien, &c.* (3d ed., 1869).

MÜLLER, Johannes, a German physiologist, born in Coblenz, July 14, 1801, died in Berlin, April 28, 1858. He was the son of a poor shoemaker, and was about to be apprenticed to a saddler when his talents attracted the attention of his teacher, and he prepared himself for the Roman Catholic priesthood. After attending in 1819 the university of Bonn, he took the degree of M. D. and went to Berlin, where under the influence of Hegel and Rudolphi he was induced to reject all systems of physiology which were not founded upon a severe philosophical observation of nature. Returning to Bonn in 1824, he lectured as private professor on anatomy, physiology, embryology, and related subjects; and in 1826 he became extraordinary professor of physi-

ology and anatomy. In 1833 he was appointed to the chair of anatomy in the university of Berlin, then considered the first in Europe in that department of science. He founded the physico-chemical school of physiology, raising it from a speculative to a positive science, and reformed the study of medicine. He generally passed his vacations on the shores of the Mediterranean, where he became a favorite with the Italians. His publications, numbering upward of 100, embrace nearly every subject in comparative anatomy and physiology, not one of which failed to receive new and valuable illustrations from his hand. His most important work is the *Handbuch der Physiologie* (Coblentz, 1833), which has been translated into English by Dr. W. Baly ("Elements of Physiology," 2 vols., London, 1837-'42), and into several other languages. Among his other works are: *De Respirazione Fœtus* (Leipsic, 1823), a prize dissertation; *Zur vergleichenden Physiologie des Gesichtsinnes des Menschen und der Thiere* (1826; English translation by Baly, 1848); *Grundriss der Vorlesungen über die Physiologie* (Bonn, 1827); *Grundriss der Vorlesungen über allgemeine Pathologie* (1829); and *Ueber die organischen Nerven der erectilen männlichen Geschlechtsorgane, &c.* (Berlin, 1835). He also wrote numerous dissertations on subjects not altogether physiological. Among these are: *Horæ Ichthyologicae* (Berlin, 1849); *Ueber die phantastischen Gesichterscheinnungen* (Coblentz, 1826); *Der Tabak in geschichtlicher, botanischer, chemischer und medicinischer Hinsicht* (Berlin, 1832); *Ueber die fossilen Reste der Zeuglodonten, &c.* (1848); and *Ueber Synopta digitata und über die Erzeugung von Schnecken in Holothurien* (1852). His latest investigations were devoted to infusoria, and his *Terminologia Entomologica* was published at Brinn in 1850. He also founded several influential periodicals for the promotion of physiology, anatomy, and other sciences.

MÜLLER, *Johannes von*, a Swiss historian, born in Schaffhausen, Jan. 3, 1752, died in Cassel, May 29, 1809. He completed his studies at Göttingen, where Schlözer diverted his attention from theology to history. He was professor of Greek in Schaffhausen from 1772 to 1774, when he removed to Geneva, where for a time he supported himself by teaching. In 1781 he accepted a professorship in Cassel, but returned to Switzerland in 1783 to prosecute historical labors, lecturing occasionally, but generally depending upon friends and incurring large debts. From 1786 to 1807 he was in the service, in various capacities, of the elector of Mentz, the emperor, and the king of Prussia, and received several titles and patents of nobility. After the occupation of Berlin by the French, he incurred the displeasure of his German friends by his subserviency to Napoleon, and by holding office under his brother, King Jerome of Westphalia. This sentiment, however, subsequently gave way to

a general acknowledgment both of his extraordinary merits as a writer and the noble traits of his character. His most celebrated work is *Die Geschichte der schweizerischen Eidgenossenschaft* (4 vols., 1780-1805), extending to 1489, and continued to the end of the 16th century by Glutz-Boltzheim (vol. v., 1816) and J. J. Hottinger (vols. vi. and vii., 1825-'9). A French translation by Monnard and Vulliemin extends to the 19th century (19 vols., Paris, 1837-'51). Among his other writings are minor political essays; *Essais historiques*, published in French under the auspices of Frederick the Great (Berlin, 1780); *Reisen der Päpste* (new ed., Aix-la-Chapelle, 1831; French translation, 1859), written against the anti-papal reforms of Joseph II., although he was a Protestant; and *Vierundzwanzig Bücher allgemeiner Geschichten*, lectures delivered in Switzerland (3 vols., Tübingen, 1811; often republished). His complete works have been published in 27 vols. (Stuttgart, 1810-'19), and 40 vols. (1831-'5). Among his biographers are Heeren (1809), Wachler (1809), and Woltmann (1810).

MÜLLER. I. *Karl Otfried*, a German archæologist, born in Brieg, Silesia, Aug. 28, 1797, died in Athens, Greece, Aug. 1, 1840. He was educated at the gymnasium of Brieg, the university of Breslau, and that of Berlin, where he graduated in 1817, and published in the same year his *Ægineticorum Liber*. On leaving Berlin he was appointed instructor in ancient languages in the Magdalenum of Breslau, where he employed much time in mythological studies and in the analysis of the different mythical cycles, the results of which are embodied in his *Geschichte hellenischer Stämme und Städte*, of which vol. i., *Orchomenos und die Minyer*, appeared at Breslau in 1820. At the recommendation of Böckh he was appointed in 1819 to a professorship at Göttingen, the duties of which included a series of lectures on archæology and ancient art; and to prepare himself he visited France, England, and various parts of Germany. His *Die Dorier* (2 vols. 8vo., Breslau, 1824), forming vols. ii. and iii. of the *Geschichte hellenischer Stämme und Städte*, was intended to show the connection of manners, religion, politics, and history in one of the Greek races. An English translation by H. Tuffnell and Sir George Cornewall Lewis was published at Oxford in 1830, with additions and corrections by the author, and a new German edition of the whole work was published at Breslau (3 vols., 1844). Of his remaining works, the most important are the *Prolegomena zu einer wissenschaftlichen Mythologie* (Göttingen, 1825; English translation by J. Leitch, London, 1844); *Ueber die Wohnsitze, die Abstammung und die ältere Geschichte des makedonischen Volkes* (Berlin, 1825); *Die Etrusker* (Breslau, 1828); and *Handbuch der Archæologie der Kunst* (translated by Leitch, London, 1850). He also undertook for the society for the diffusion of useful knowledge a

history of Greek literature, the first volume of which was translated into English by Lewis and Donaldson (1840), previous to its publication in Germany, where it was issued after Müller's death by his brother Eduard (*Geschichte der griechischen Literatur bis auf das Zeitalter Alexanders*, 2 vols., Breslau, 1841; 2d ed., 1857), and was brought down by Donaldson in English to the capture of Constantinople (3 vols., London, 1858). He published also several special archæological treatises and articles in periodicals, and edited Festus, Varro's *De Lingua Latina*, and the *Eumenides* of Æschylus. In 1839 he undertook a tour of exploration in southern Italy and Greece, and while superintending excavations at Delphi contracted a fatal fever. He was removed before his death to Athens, and buried on an eminence near the site of Plato's academy. A collection of his *Kleine deutsche Schriften* was published posthumously by his brother Eduard (3 vols., Breslau, 1847-'8).—See *Erinnerungen an Otfried Müller*, by Lücke (Göttingen, 1841). **II. Julius**, a theologian, brother of the preceding, born in Brieg, April 10, 1801, died Sept. 27, 1878. He abandoned the study of law for that of theology, and was settled over several small parishes from 1825 to 1831. He was then appointed preacher at the university of Göttingen, and in 1834 professor of theology. From 1835 to 1839 he filled the same chair at Marburg, and afterward at Halle. He published various theological works and essays, and his *Die Christliche Lehre von der Sünde* (Breslau, 1839; 4th revised ed., 2 vols., 1858; English translation by W. Pulsford, "The Christian Doctrine of Sin," 2 vols., Edinburgh, 1852-'3) is one of the most noted productions of contemporary German Protestant literature. In 1850 he was associated with Neander and Nitzsch in founding the *Deutsche Zeitschrift für christliche Wissenschaft und christliches Leben*. Having been a representative of evangelical union in the Berlin synod of 1846, he published in 1854 *Die evangelische Union, ihr Wesen und göttliches Recht*. **III. Eduard**, brother of the preceding, born in Brieg, Nov. 12, 1804. Since 1853 he has been director of the gymnasium of Liegnitz, and has published *Geschichte der Theorie der Kunst bei den Alten* (2 vols., Breslau, 1834-'7), and a tragedy, *Simson und Delilah* (1853).

MÜLLER, Otto, a German novelist, born at Schotten, Hesse-Darmstadt, June 1, 1816. He began his career as a librarian and a journalist, and resided in various places till 1856, when he settled in Stuttgart. He early published a series of novels, and in 1845 appeared his *Bürger, ein deutsches Dichterleben*, which was followed by *Georg Volker* and other political novels. In 1854 appeared his admirable *Charlotte Ackermann*. Among his subsequent novels are *Der Klosterhof* (1859), *Aus Petrarca's alten Tagen* (1862), *Erzählungen und Charakterbilder* (1865), *Der Wildpfarrer* (1866), *Der Professor von Heidelberg* (1870), *Der Fall von Konstanz* (1872), and *Der Majoratsherr*

(1873). His *Ausgewählte Schriften* appeared in Stuttgart (12 vols., 1874).

MÜLLER, Otto Frederik, a Danish naturalist, born in Copenhagen in March, 1730, died Dec. 26, 1784. He was educated for the church, became tutor to a young nobleman, and after several years' travel with him settled in Copenhagen in 1767, and married a lady of wealth. His first important works, *Fauna Insectorum Friedrichsdaliana* (Leipsic, 1764), and *Flora Friedrichsdaliana* (Strasbourg, 1767), recommended him to Frederick V. of Denmark, by whom he was employed to continue the *Flora* of Denmark, and he added two volumes to the three published by Oeder since 1761. The study of zoölogy, and particularly of the minute animals, meanwhile began to occupy his attention almost exclusively, and in 1771 he produced a work in German on "Certain Worms inhabiting Fresh and Salt Water," which described many new species of those annulose animals called by Linnæus *aphroditæ* and *nereides*, and gave much additional information respecting their habits. In his *Vermium Terrestrium et Fluviatilium, seu Animalium Infusoriorum, Helminthecorum, et Testaceorum non Marinorum, succincta Historia* (2 vols. 4to, Copenhagen and Leipsic, 1773-'4), he arranged the infusoria for the first time into genera and species. His *Hydrachnæ in Aquis Danicæ Palustribus detectæ et descriptæ* (Leipsic, 1781), and *Entomostraca* (1785), describe many species of minute animals previously unknown. To these was added an illustrated work on the infusoria, published in 1786. These three works, according to Cuvier, give the author "a place in the first rank of those naturalists who have enriched science with original observations." His *Zoologica Danica*, which was intended to correspond in the animal kingdom with the *Flora Danica* in the vegetable, was commenced in 1779, but only two parts, each containing 40 plates, were finished by him.

MÜLLER, Peder Erasmus, a Danish bishop, born in Copenhagen, May 29, 1776, died Sept. 16, 1834. He was educated at the university of Copenhagen, where, after visiting France and England, he was appointed professor of theology in 1801, and in 1830 bishop of Seeland. He published theological treatises and works on the language, literature, and history of Denmark and Iceland. The most celebrated is his "Library of the Sagas" (1816-'20), in which he gives an account of all the Icelandic sagas or tales. From 1805 to 1832 he was editor of the "Danish Literary Gazette" (*Dansk Literatur Tidende*).

MÜLLER, Sophie, a German actress, born in Mannheim in 1803, died at Hietzing, near Vienna, June 20, 1830. She was a daughter of the actor Karl Müller (1783-1837), and appeared on the Carlsruhe stage in her 15th year. In 1821 she went to Munich, and in 1822 was engaged at the court theatre of Vienna, acquiring the reputation of one of the most distinguished tragedians of her day. She also

became reader to the empress of Austria. Her biography, by Mailáth, was published at Vienna in 1832.

MÜLLER, Wilhelm, a German poet, born in Dessau, Oct. 7, 1794, died there, Oct. 1, 1827. He studied at the university of Berlin, and after serving in the war of liberation (1813-'14) he returned to Berlin, and applied himself especially to the ancient German language and literature. From 1817 to 1819 he travelled in southern Germany and Italy, and on returning was appointed classical instructor in the new normal school of Dessau. His works include *Blumenlese aus den Minnesängern* (1816); a translation of Marlowe's "Faustus" (1818); and *Lieder der Griechen* (1821-'4). His translation of patriotic Greek songs for Fauriel's collection (2 vols., 1825), and his *Lyrische Spaziergänge* (1827), are his best productions. His *Vermischte Schriften* were published by S. Schwab with a biography (5 vols., Leipsic, 1830). His *Gedichte* (2 vols., 1837) had several editions, and his *Ausgewählte Gedichte* appeared in 1864. He was the father of Max Müller. (See MÜLLER, FRIEDRICH MAX.)

MÜLLER, William John, an English painter, born in Bristol in 1812, died there, Sept. 8, 1845. He studied with J. B. Pyne, the landscape painter, and in 1833-'4 made a tour through Germany, Switzerland, and Italy. In 1838-'9 he made a tour through Greece and Egypt, among the results of which were two landscapes, "Athens from the Road to Marathon," and "Memnon, or Ruins at Gornou in Egypt at Sunset." In 1843 he accompanied Sir Charles Fellows on his expedition in quest of the Xanthian marbles. Five pictures of Asiatic scenery in the exhibition of 1845 were, like previous contributions, treated with neglect, and soon after he was seized with illness, the result of mortification, from which he never recovered. His pictures subsequently commanded high prices, and a collection of 300 sketches was sold soon after his death for £4,360.

MÜLLER VON KÖNIGSWINTER, Wolfgang, a German poet, born at Königswinter, near Bonn, March 5, 1816. He studied medicine at Bonn, graduated at Berlin in 1840, and was a physician in Düsseldorf from 1842 to 1853, when he removed to Cologne, where he became a popular poet, novelist, and chronicler of the Rhine region. Among his works are: *Junge Lieder* (1841); *Balladen und Romanzen* (1842); *Rhein-fahrt* (1846); *Gedichte* (2d ed., 1857); *Lorelei* (2d ed., 1857); *Eine Maikönigin* (1852); *Prinz Minnewin* (1854); *Der Rattenfänger von St. Goar* (1857); *Johann von Werth* (1858); *Erzählungen eines rheinischen Chronisten* (1860); *Vier Burgen* (1862); *Zum stillen Vergnügen* (1865); *Der Pilger in Italien* (1868); and *Durch Kampf zum Sieg* (1871).

MULLET, a name given to two families of acanthopterygian fishes, the *mugilidæ* and the *mulloidæ*, though the latter, to avoid confusion, are better styled surmullet. In the *mugilidæ* the body is more or less cylindrical; head and

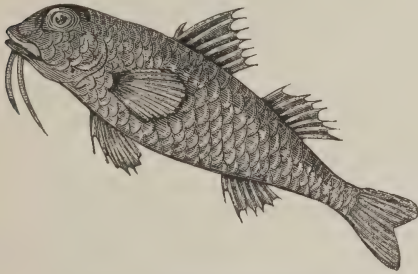
body covered with large, easily detached scales, in reality ctenoid, but so slightly denticulated as to appear cycloid; gill covers thin and smooth; head flattened, and the eyes large and far apart; the mouth small, and the teeth, when present, exceedingly fine; a kind of crest in the lower jaw received into a groove in the upper; dorsals two, small and distinct, the first with usually four spinous rays, the second with flexible rays; ventrals behind pectorals; the pharyngeals are very large, the stomach rather fleshy, and the intestine with a few pyloric cæca; the swimming bladder is large. More than 50 species of the principal genus *mugil* (Linn.) have been described, from Europe, America, Africa, and the East Indies, inhabiting salt water, in preference about the mouths of rivers which they can ascend or descend with the tide. The gray mullet of western Europe (*M. capito*, Cuv.) attains a length of from 1 to 2 ft., the color above is dusky gray tinged with blue, the sides and belly silvery with longitudinal parallel dusky lines; a dark spot at the base of the pectoral fin. They are highly esteemed as food, and are caught in nets, from which they attempt to escape by jumping over the edge. This species is common on the English coasts, never far from land, and ventures many miles inland with the tide; it is one of the species which thrive in fresh water; the food consists of soft or decaying animal or vegetable substances; the spawning time is in midsummer. The gray mullet of the Mediterranean (*M. cephalus*, Cuv.) may be known by the two adipose veils which half cover the eyes, by the long ridged scale at the base of the pectoral fins, and by the entire concealment of the maxillary bone when the mouth is shut; it attains a weight of 10 or 12 lbs., and is taken in nets in great quantities at the mouths of rivers; the flesh is tender, delicate, and fine-flavored, and has been esteemed from ancient times; it is eaten fresh, salted, and smoked. Of the American species may be mentioned the striped mullet (*M. lineatus*, Mitch.), 6 or 8 in. long, purplish brown above, lighter on the sides, with 10 or 12 dark brown longitudinal stripes, pupils black and



Striped Mullet (*Mugil lineatus*).

irides yellowish white, and abdomen pearl gray; this is an excellent fish, ranges from New York southward, and appears in the markets in early autumn; the white mullet (*M. albula*, Linn.), of a general whitish color, about 9 in. long, plump and firm, appearing in

July and August, and prized by epicures; and the rock mullet (*M. petrosus*, Cuv.), like the last, found from New York to the gulf of Mexico. The African and Asiatic species are generally greenish brown above, with golden and silvery reflections, and white below.—The other family of mullets, more properly called surmullets (*mullidæ*), have some affinities with the perch family in the position of the fins, but differ from them in the unarmed opercula and the slightly ctenoid character of the scales; the branchiostegal rays are four; the scales are large and easily detached; the dorsals are two, widely separated, and all the fins are moderate; body oblong, little compressed; profile nearly vertical; mouth small, and teeth feeble; gill opening wide; eyes large and at top of the head; in most species the lower jaw has two barbels at the symphysis. In the genus *mullus* (Linn.) there are no teeth in the upper jaw, but pavement-like ones on the vomer and lower jaw, and no air bladder. The red mullet (*M. surmuletus*, Linn.) is bright red above and on the sides, with three golden yellow longitudinal lines behind the pectorals, and rosy white below; it attains a length of 12 to 15 in. It is found from the English coast southward, being more common to the south, and very abundant in the Mediterranean, where it feeds upon crustaceans and mollusks; it is less esteemed as food than the next species. The bearded mullet (*M. barbatus*, Linn.) has a more vertical profile and a deeper and more



Bearded Mullet (*Mullus barbatus*).

uniform red color; comparatively rare north of the English channel, it is most abundant in the Mediterranean; this is the *rouget* of the French. Of about the same size as the last, it is more highly esteemed for its white, firm, well flavored, and easily digested flesh; the old Roman epicures paid immense prices for this fish; they kept them alive in *vivaria*, and exhibited their brilliant colors, rendered more beautiful in the agonies of death, to their guests.—In America fish of the allied genus *upeneus* (Cuv.), with teeth in both jaws, are called mullets; most of these have a large air bladder. The *U. maculatus* (Bloch), with others, 6 or 8 in. long, is found in the gulf of Mexico, the West Indies, and South America; the color is red, with a few blackish spots; the flesh is not much prized.

MÜLLNER, Amadeus Gottfried Adolf, a German dramatist, born at Langendorf, near Weissenfels, Oct. 18, 1774, died in Weissenfels, June 11, 1829. He practised for some time as a lawyer, and wrote on jurisprudence; but he is best known by his dramas *Der neunundzwanzigste Februar* and *Die Schuld*, which were among the most popular productions of the fatalistic dramatic school. His miscellaneous writings were published in 2 vols. (Stuttgart, 1824-'6), and his dramatic works in 7 vols. (Brunswick, 1828). The hundredth anniversary of his birth was celebrated at Weissenfels in 1874.

MULOCK, Dinah Maria. See CRAIK.

MULREADY, William, a British painter, born in Ennis, Ireland, April 1, 1786, died at Bayswater, near London, July 7, 1863. He was admitted a student of the royal academy at 14 years of age. His "Rattle" (1808), "Roadside Inn" (1811), and "Punch" (1813) showed careful study from nature and a good idea of color. His "Idle Boys" (1815) procured his election as an associate of the academy, and in 1816 he was admitted to full membership. His subsequent works, including "The Fight Interrupted" (1816), "Lending a Bite" (1819), "The Wolf and the Lamb" (1820), "The Convalescent" (1822), "The Origin of a Painter" (1826), "The Last In" (1835), "First Love" (1840), and "The Ford" (1842), established his reputation. In 1840 he prepared 20 designs to illustrate the "Vicar of Wakefield," which suggested his subsequent pictures, "The Whistonian Controversy" (1844), "Choosing the Wedding Gown" (1846), and "Burchell and Sophia" (1847). Of his later works the best known are "The Butt" (1848), "Women Bathing" (1849), and "Blackheath Park" (1852). Choice specimens of his style are contained in the royal collection, in the Vernon and Sheepshanks portions of the national gallery, and in the Peel collection.

MULSO, Hester. See CHAPONE.

MULTNOMAH, a N. W. county of Oregon, bordering E. on the Cascade mountains, bounded N. by the Columbia river, and intersected in the west by the Willamette; area, about 400 sq. m.; pop. in 1870, 11,510, of whom 508 were Chinese. The soil is generally fertile, and agriculture and cattle raising are the chief industries. It is traversed by the Oregon and California and Oregon Central railroads. The chief productions in 1870 were 5,003 bushels of wheat, 1,473 of Indian corn, 11,882 of oats, 3,724 of barley, 1,826 of peas and beans, 60,490 of potatoes, 4,626 lbs. of wool, 115,549 of butter, 11,260 of cheese, and 6,138 tons of hay. There were 838 horses, 1,966 milch cows, 2,213 other cattle, 2,583 sheep, and 2,583 swine; 1 manufactory of awnings and tents, 4 of bread, 8 of carriages and wagons, 27 of clothing, 3 of confectionery, 6 of cooperage, 5 of furniture, 4 of iron castings, 6 of engines and boilers, 5 of saddlery and harness, 3 of sash, doors, and blinds, 8 of tin, copper,

and sheet-iron ware, 5 of upholstery, 5 tanneries, 4 breweries, 3 flour mills, 1 planing mill, 7 saw mills, and 1 beef and 1 pork packing establishment. Capital, Portland.

MUMMIUS, Lucius, a Roman general of the 2d century B. C. He was prætor in 154 B. C. His province was Further Spain, where he met with several defeats, but finally was victorious over the Lusitanians and Bosto-Phœnicians. When he became consul in 146, the Achæan chiefs, only partially humbled by the victories of Metellus, his predecessor, had assembled an army on the isthmus of Corinth. Mummius took command in person, easily defeated the Achæans, and entered Corinth. The city, almost entirely deserted by its inhabitants, was pillaged and burned. Mummius carried off an immense quantity of spoils, consisting largely of the finest paintings and statuary in Greece. Many of the rarer works he sold to the king of Pergamus, and the remainder he sent to Rome, where such of them as had escaped the perils of the sea were exhibited in his triumph. For his great victory, which completed the conquest of Greece, Mummius received the surname Achaicus, being the first *novus homo* thus honored for military service. He

remained in Greece during the greater part of the years 146 and 145, having in the latter year the title of proconsul. He governed wisely, and respected the religion of the people. He became censor in 142 with Scipio Africanus the younger; the two men were exact opposites in character and culture, and disagreed in everything. Mummius was rustic, rigidly honest, but lenient to others, and died poor.

MUMMY (Persian and Arabic, *mumiyā*, from the Persian *mum*, naphtha or liquid asphaltum), a dead body embalmed, or preserved from decay by desiccation. The custom of thus preserving the bodies of the dead prevailed among several ancient nations. The Assyrians, Persians, and Ethiopians practised it to some extent, as did also the Hebrews, Greeks, and Romans, and in America the Mexicans and Peruvians; but it was most general among the Egyptians, who embalmed all their dead. For the methods employed by the last, see **EMBALMING**. After the embalming process was finished, the Egyptians swathed the body with narrow linen bandages

gum of the *mimosa Nilotica*. These were wound around with great nicety, all the irregularities being padded so as to bring the body to a symmetrical shape. In the Greek and Roman period the limbs were bound separately, but the Egyptians enclosed in one envelope the entire body, which when thus prepared exhibited only the general outlines of the human form, even the face being covered. The bandages, which differ in quality from fine muslin to coarse canvas, were sometimes more than 1,000 yards in length. The body was next enclosed in a cartonnage or case made of layers of cloth cemented together, which was probably adjusted to it when damp so as to take its exact shape. When fitted it was taken off, dried, and then put on again and sewed up at the back; after which it was richly painted and gilded, the face being colored to represent



1. Mummy in Bandages. 2. Cartonnage. 3. Outer Case. 4. Sarcophagus.

the features of the deceased, or overlaid with thick gold leaf, and the eyes made of enamel. The cartonnage was covered with other cases, sometimes three or four, made of cedar or sycamore, similarly painted. The cases varied in number, beauty, and style, in proportion to the expense incurred by the friends of the deceased, and the whole was sometimes placed in an outer sarcophagus of wood or stone, ornamented with paintings or sculptures. Mummies thus prepared were of those embalmed by the most expensive process, generally the bodies of priests or other dignitaries. The bodies of the middle classes seldom had more than one covering, and those of the lower orders were merely wrapped in coarse mats. Within the bandages were often placed papyri, small figures of Osiris in blue porcelain, scarabæi, amulets, necklaces of glass beads or agate, ear rings, finger rings, bracelets, hair pins, and other ornaments; and many of these are now found in mummies which have been undisturbed. Mummies preserved by resinous substances are of an olive color, and the skin dry, flexible, and as if tanned. The features appear

as during life; the teeth, hair, and eyebrows are well preserved. Mummies of this kind are light, dry, and easily broken. Those filled with bitumen are black; the skin hard and shining, as if varnished; the features perfect; and the whole corpse dry, heavy, and difficult to break. Of mummies preserved with natron and filled with asphaltum and resinous substances, the skin is hard and elastic, resembling parchment, and does not adhere to the bones; the countenance is little altered, but the hair falls off on being touched. The bodies of the poor, which were salted and boiled in bitumen, are black, dry, heavy, and very hard to break, and neither the hair nor the eyebrows are preserved. It has been estimated that more than 400,000,000 human mummies were made in Egypt from the beginning of the art of embalming until its discontinuance in the 7th century. In addition to these, vast numbers of sacred animals, bulls, apes, cynocephali, dogs, cats, sheep, vultures, falcons, ibises, geese, lizards, serpents, crocodiles, and fish were embalmed. The principal places where mummies are found are the necropolis in the plain of Sakkarah, opposite the site of Memphis, and the necropolis of Thebes. Great numbers have been removed, and mummies of the best class are now scarce. Many are burned for fuel by the Arabs, and ship loads have been transported to England to be ground up for manure.

MUMPS (*cynanche parotidea*, *parotitis*), a specific inflammation of the parotid and submaxillary glands. This curious affection, called by the Scotch *branks*, and by the French *oreillons* or *ourles*, has been known from the time of Hippocrates. It commences with a feeling of pain and tension beneath the ear, swelling takes place, and motion of the jaw is painful. The swelling soon involves the parotid and submaxillary glands; it is somewhat pasty to the feel, and is unattended with redness of the skin. Sometimes one side only is affected, sometimes both at once, more commonly one after the other. The disease is attended with slight fever, but the pain is by no means proportioned to the swelling and the deformity. The duration of the complaint is from eight to ten days, it taking four days to attain its height, and four days being occupied by its decline. Occasionally in males the testes, and in females the breasts, become swollen and hard as the swelling of the salivary glands subsides; and very rarely, in the subsidence of the swelling, either of the parotid or of the testes, inflammation of the brain or its membranes has occurred. The disease is often epidemic, and is generally believed to be contagious. It ordinarily requires little treatment, the administration of a laxative and warm and emollient applications to the affected part being all that is necessary. When the brain is attacked, it must be treated irrespective of the original affection.

MUNCH, Ernst Hermann Joseph von, a German historian, born in Rheinfelden, Switzerland,

Oct. 25, 1798, died there, June 9, 1841. He was for some time professor at Freiburg, and filled the chair of ecclesiastical history and law at Liège. He was also royal librarian at the Hague, and director of the private library of the king of Würtemberg. Among his principal works are *Allgemeine Geschichte der neuesten Zeit* (6 vols., Leipsic, 1833-'5), and his autobiography, *Erinnerungen und Studien aus den ersten 37 Jahren eines deutschen Gelehrten* (3 vols., Carlsruhe, 1836-'8).

MUNCH, Friedrich, a German author, born at Niedergemünden, Hesse-Darmstadt, June 25, 1799. He is the son of a clergyman, studied theology at Giessen, and succeeded his father as pastor of the village church. He founded in 1833, with Paul Follen, an emigration society at Giessen, and came with a number of emigrants to the United States, settling as a farmer in Missouri. He was active in promoting German immigration, and was a member of the Missouri senate from 1862 to 1866. He has published *Ueber Religion und Christenthum* (1847), of which an English edition appeared in Boston; *Der Staat Missouri* (New York, 1859; 2d ed., abridged, Bremen, 1866); *Amerikanische Weinbauschule* (3d ed., St. Louis, 1867); *Die sinnliche und die geistige Lebensansicht* (Philadelphia, 1871); *Geisteslehre für die heranreifende Jugend* (St. Louis, 1872); and *Das Leben von Karl Follen* (Neustadt-on-the-Haardt, 1872).

MUNCH, I. Peder Andreas, a Norwegian historian, born in Christiania, Dec. 15, 1810, died in Rome, May 25, 1863. He graduated in 1834 at the university of Christiania for the civil service, but devoted himself to philology and history, and became lecturer in 1837, professor in 1841, and historiographer of the king and archivist of Norway in 1861. His principal work is *Det norske Folks Historie* (9 vols., Christiania, 1852-'63), for the preparation of which he visited England, Scotland, and France. From 1858 to 1861 he was at work in the archives of the Vatican, and he returned to Rome shortly before his death. He also published grammars of the Runic, Old Norwegian, and Old Norse languages, and prepared several editions of Old Norse philological works. **II. Andreas**, a Norwegian poet, cousin of the preceding, born Oct. 19, 1810. He was the son of the bishop of Christiansand, and studied jurisprudence at Christiania. He published a volume of poems in 1836 and a drama in 1837. From 1841 to 1846 he edited a journal, and from 1850 to 1860 was amanuensis in the university library. A stipend voted to him by the storting in the latter year enabled him to devote himself to literature, and to publish collections of his poems. His *Sorg og Trøst* (1852) has had several editions. Among his other works are *Billeder fra Syd og Nord*, an account of a journey to Italy (1848), and the dramas *Salomon de Caus* (1854), *En Aften paa Giske* (1855), *Lord William Russel* (1857), and *Hertug Skule* (1863).

MÜNCH-BELLINGHAUSEN, Eligius Franz Joseph von, baron, a German dramatist, known by his pseudonyme of Friedrich Halm, born in Cracow, April 2, 1806, died in Vienna, May 21, 1871. His first drama, *Griseldis* (Vienna, 1834), was well received. Of the succeeding ones, the most celebrated are *Der Sohn der Wildniss* (1842; translated into English by Charles E. Anthon, New York, 1848, under the title of "The Son of the Wilderness," but frequently performed on the American stage under that of "Ingomar the Barbarian"), and *Der Fechter von Ravenna* (1854). Among his later works is a drama entitled *Iphigenie in Delphi*, in imitation of Goethe's *Iphigenie*, and a play written for the Schiller festival in 1859 entitled *Vor hundert Jahren*. He published a volume of poetry (1850), a work on ancient Spanish plays (1852), and an edition of his works (8 vols., 1857-'64). In 1861 he was made member for life of the Austrian house of lords. For several years he was first keeper of the imperial library, and from 1867 to 1870 director of the court theatre in Vienna.

MÜNCHHAUSEN, Hieronymus Karl Friedrich von, baron, a German soldier, born at Bodenwerder, Hanover, in 1720, died there in 1797. He served in his youth as a cavalry officer in the Russian army, and passed his latter days in Hanover. He delighted in telling wonderful stories of his adventures in the campaign against the Turks in 1737-'9, which gained for him the reputation of being one of the greatest liars who ever lived. The stories were repeated from one end of the country to the other, and created universal merriment. They are said to have been first compiled by Rudolf Erich Raspe, a man of letters, who, being compelled to flee from Cassel to England on account of a charge of embezzlement, was engaged in London in literary pursuits, and is generally believed to have published anonymously an English edition of the stories under the title of "Baron Munchausen's Narrative of his Marvellous Travels and Campaigns in Russia" (London, 1785). A second edition, considerably enlarged and ornamented with views from the baron's drawings, was published at Oxford in 1786, under the title of "The Singular Travels, Campaigns, Voyages, and Sporting Adventures of Baron Munnikhousen, commonly pronounced Munchausen; as he relates them over a bottle when surrounded by his friends." A third edition (London, 1786) bore the additional title of "Gulliver Revived," and was soon followed by others. The work was first issued in a German form in 1787, under the auspices of the poet Bürger. A German edition of this famous work, entitled *Des Freiherrn von Münchhausen wunderbare Reisen und Abenteuer* (Göttingen and Berlin, 1849), contains an introduction by Adolf Ellisson upon the life and writings of the author, the sources and originals of the Münchhausens, and the literature of fictitious travels in general. But a large proportion of the hunting

stories in this edition are derived from Henry Bebel's *Facetiæ* (Strasburg, 1508), while other incidents are borrowed from Castiglione's *Cortegiano* and Bildermann's *Utopia*, which are included in Lange's *Delicia Academicæ* (Heilbronn, 1765). A free German version of the English edition appeared in Leipsic in 1846, under the title of *Münchhausens Lügenabenteuer*. The work still maintains its popularity in Germany as well as in England and the United States. Imitations of Münchhausen's stories are called in Germany *Münchhausiaden*. The success of the work gave rise to Immermann's celebrated novel *Münchhausen* (4 vols., 2d ed., Düsseldorf, 1841), and to Adolf Schrödter's picture representing the baron surrounded by his listeners.

MUNDT. I. Theodor, a German author, born in Potsdam, Sept. 19, 1808, died in Berlin, May 30, 1861. He was educated in Berlin and Leipsic, and became prominent among the young Germany school of writers and politicians. His liberalism giving umbrage to the government, he travelled in various parts of Europe, and was permitted to teach at the university of Berlin after his return in 1839. In 1848 he was appointed professor of general literature and history at Breslau, and in 1850 he became director of the library of the Berlin university. Among his earliest writings was *Madonna, oder Unterhaltungen mit einer Heiligen* (Leipsic, 1834); its morbid though poetical views of life are said to have prompted Charlotte Stieglitz to commit suicide from devotion to her husband, whom she hoped to divert from his varied troubles by the greater sorrow caused by her death. (See STIEGLITZ, HEINRICH.) Mundt edited her writings under the title *Charlotte Stieglitz, ein Denkmal* (Berlin, 1835). Among his subsequent works are a series of novels, including *Thomas Münzer* (Altona, 1841), and *Carmola, oder die Wiedertaufe* (Hanover, 1844); *Mendoza, oder der Vater der Schelme* (Berlin, 1847); and *Die Matadore* (Leipsic, 1850). He also published *Spaziergänge und Weltfahrten* (Altona, 1838-'40), *Völkerschau auf Reisen* (Stuttgart, 1840), and other sketches of travels, and a delineation of the character of Knebel in the edition of that author's posthumous works which he prepared in concert with Varnhagen von Ense. Among his other productions are *Kunst der deutschen Prosa*; *Allgemeine Literaturgeschichte*, in continuation of that of Schlegel; *Dramaturgie*; *Geschichte der Literatur der Gegenwart*, &c. His *Geschichte der Gesellschaft* (1844) was followed by a *Geschichte der deutschen Stände* (1854); and he published in 1851 a work on Machiavelli. In 1844 he began the publication of an edition of Luther's political works. His last work, *Rom und Neapel*, appeared in 1860. **II. Klara** (MÜLLER), best known by her pseudonyme of **LUISE MÜHLBACH**, a German novelist, wife of the preceding, born in Neubrandenburg, Jan. 2, 1814, died in Berlin, Sept. 27, 1873. She was married in 1839, and

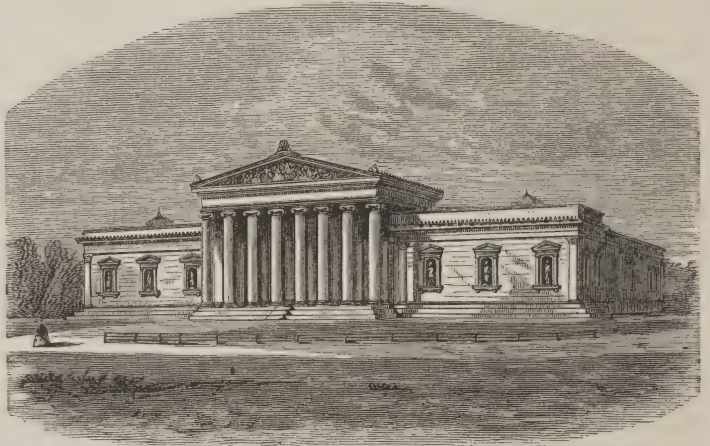
in the same year published her first novel. The long series of romances which followed gained great popularity, and brought her a large fortune, enabling her to support her husband during the long illness which preceded his death, and to build a handsome residence in Berlin, where she was a prominent figure in literary society. Mme. Mundt was an advocate of female suffrage and of great changes in the social position of women, an extreme liberal in her political views, and a frequent participant in reform movements in these and similar directions. She wrote many essays on social questions. Her historical romances have been translated into English, and are as well known in Great Britain and America as in Germany. The facts of history are very freely treated in them, and the imagination of the writer is allowed full liberty; but the narratives are spirited, and the social features of the periods of which they treat are often fairly represented. The best known of these works are "Frederick the Great and his Court," "Joseph II. and his Court," "The Merchant of Berlin," "Frederick the Great and his Family," "Berlin and Sans-Souci," "Henry VIII. and Catharine Parr," "Louisa of Prussia and her Times," "Marie Antoinette and her Son," "The Daughter of an Empress," "Napoleon and the Queen of Prussia," "The Empress Josephine," "Napoleon and Blücher," "Queen Hortense," "Goethe and Schiller," "Andreas Hofer," "Prince Eugene and his Times," and "Mohammed Ali and his House." Among her latest works were "The Thirty Years' War," "Emperor William," and "From Königrätz to Chiselhurst," all published in 1873. She wrote in all more than 50 separate novels, comprising nearly 100 volumes.

MUNICH (Ger. *München*), the capital of Bavaria and of the district of Upper Bavaria, on the Isar, in the midst of an extensive plain, 1,700 ft. above the level of the sea, in lat. 48° 9' N., lon. 11° 35' E., 33 m. S. E. of Augsburg, 290 m. S. S. W. of Berlin, and 220 m. W. of Vienna; pop. in 1871, 169,478 (in 1812, 40,000). It is celebrated for its architectural splendor, for its admirable institutions and works of art, and for its university. The city is composed of the old and the new town and of five suburbs on the left bank and three on the right bank of the Isar. The river is spanned by four bridges, the Isar bridge being the largest and the Maximilian the finest and most recent. The number of streets is about 275, and new streets are springing up in every direction, particularly near the new railway stations in Haidhausen and other suburbs, and in the S. part of the city. The streets in the old town are irregular, but spacious and bustling. The most celebrated in the modern city are the Ludwig and Maximilian streets, which respectively contain the most remarkable public and private buildings. There are nearly 20 squares, of which the Max-Joseph is the largest; and others conspicuous for attractiveness are the Odeon, Wittels-

bach, Maximilian, Karl, and Promenade squares, the Carolinenplatz, and the Königsplatz. Favorite promenades are the Hofgarten and the English garden, the latter remarkable for a Greek temple and other embellishments. The S. continuation of it, known as the Hirschau, abounds with deer, stags, and pheasants; and N. of the park is the new zoological garden. Not far from Munich is the park adjoining the palace of Nymphenburg, and the picturesque scenery of the upper banks of the Isar makes many of the neighboring villages favorite resorts, while the immediate vicinity of the city teems with public gardens.—Munich contains upward of 20 Roman Catholic churches and chapels. St. Peter's, the oldest, dates from the 13th century. The Gothic cathedral (*Frauenkirche*), completed at the end of the 15th, has two lofty dome-capped towers. St. Michael's is remarkable for the beauty of the interior and for the width of its roof unsupported by pillars; it contains Thorwaldsen's monument of Eugène de Beauharnais. St. Cajetan's contains the tombs of the royal family. The modern edifices are however the most interesting. All Saints' chapel (*Allerheiligen-Kapelle* or *Hofkapelle*) has columns of red Tyrolese marble with white bases and gilded capitals. The upper part of the aisles is incrustated with colored marbles; all the rest is covered with frescoes upon a golden ground. The *Ludwigskirche*, in the round arch style, is also famous for the beauty of its execution and its designs, and for the wealth of its decorations, which comprise colossal statues of St. Peter and St. Paul and other works by Schwanthaler, and Cornelius's "Last Judgment," upward of 60 ft. high. The parish church of *Maria-Hilf*, in the Au suburb, and in the German pointed style of the 14th century, with high lancet windows, contains 19 painted windows illustrative of incidents in the life of the Virgin. The church or basilica of St. Boniface, finished in 1850, in the Byzantine style, is the largest and most splendid of them all. The front has a portico of eight Corinthian columns with three bronze doors. The side façades have a double row of round-headed windows. The interior, divided into a nave 75 ft. high and 50 ft. wide, and a number of aisles, is supported by 64 monolithic columns of marble disposed in four rows. The pavement is of marble mosaic, and the roof of open timber work, the beams of which are carved and richly decorated, and the ceiling between them azure with golden stars. The frescoes on the walls represent saints and martyrs and incidents in the life of St. Boniface.—The majority of the population are Roman Catholics, and an archbishop resides here. Munich has also recently become the great centre of the Old Catholic movement. There are about 16,000 Protestants, who have several places of worship. There is only one synagogue, Jews being less numerous here than in most other parts of Germany, numbering

barely 2,000. Charitable institutions are numerous; the most prominent are those for the blind and deaf and dumb, and the new lunatic asylum in the Au suburb. The penitentiary, or great prison, in the same locality, is one of the most remarkable establishments of the kind in Germany, resembling a manufactory in which every handicraft is carried on, the prisoners, male and female, being obliged to work at their respective trades. Among the finest official buildings are the war and post offices, the mint, the office of the mining and salt works, and the renovated city hall (*Rathhaus*).—The Ludwig-Maximilian university, founded in Ingolstadt in 1472, and in 1800 transferred to Landshut, was removed to Munich in 1826, and has since attained world-wide celebrity, particularly under the reign of Maximilian II. (1848-'64). The 400th anniversary of its foundation was celebrated in 1872. In the winter term of 1874-'5 it was attended by 1,145 students, including 80 in Roman Catholic theology, 223 in jurisprudence, &c., 307 in medicine and pharmacy, and 432 in philosophy. Connected with it were 113 professors, one of whom is Dr. Döllinger. Attached to the university, which occupies a new and imposing edifice, are the Georgianum or theological school, a philological seminary, anatomical and clinical institutions, and the general hospital. The royal polytechnic school, founded within the last generation, has rapidly risen to great importance, and was attended in 1875 by upward of 1,300 students. A fine building was appropriated in 1863 for an athenæum for training young men for the civil service, and contains Kaulbach's "Battle of Salamis," one of 100 paintings illustrating universal history. There are many other educational institutions in Munich, extending over every specialty of military and civil instruction, and including a Catholic normal seminary. The libraries of Munich are extensive and numerous. The most celebrated is the royal or public library (*Hof- und Staatsbibliothek*), a splendid building in the Ludwig street, resembling an Italian mediæval palace, and containing a reading room, 900,000 volumes, and 22,000 manuscripts, the books from suppressed monasteries greatly contributing to swell the number. Next in extent is the university library, with 230,000 volumes and 2,000 manuscripts. The academy of sciences is rich in scientific collections, and has jurisdiction over the cabinet of antiquities in the old royal

palace, the chemical laboratory established by Liebig, the botanic garden and the new palm house, and the observatory and meteorological bureau, near the neighboring village of Bogenhausen.—The academy of fine arts, including the Schwanthaler and other museums, is devoted to architecture, sculpture, drawing, and engraving. Piloty succeeded Kaulbach as president in 1874. A plot of ground near the Siegesthor was in 1874 purchased by the government for the erection of a new building for the academy. The Glyptothek or sculpture gallery is surrounded by pleasure grounds, and consists of 12 halls named after the statues which they contain. The 1st is filled with Egyptian sculptures, and the 2d with the earliest Greek and Etruscan; the 3d with Æginetan antiquities, which are especially celebrated for the marbles discovered in 1811 and restored by Thorwaldsen; the 4th (the hall of Apollo) is devoted to the works of Phidias; the 5th



The Glyptothek.

(hall of Bacchus) contains the sleeping or Barberini faun, and other famous works; the 6th (hall of the sons of Niobe) is remarkable for a kneeling figure of Ilioneus, the youngest son of Niobe; the 7th (hall of the gods) is devoted to heathen mythology, and the 8th (Trojan hall) to the heroes of Homer; in the 9th (hall of heroes), are statues of Alexander the Great and Nero; the 10th (Roman hall) is remarkable for its decoration, and contains busts which exhibit the decline of Roman art; the 11th is the hall of colored sculpture; and the 12th is that of modern statuary, containing Thorwaldsen's Adonis and bust of King Louis I. The Pinakothek or picture gallery, a more extensive building than the Glyptothek, like the latter designed by Klenze, was completed in 1836. It contains about 1,300 paintings, consisting of the best works of the royal collections, arranged according to schools in 9 halls and 23 compartments, the large works of each school being placed in the central hall, which

communicates on one side with the collections of the smaller paintings, and on the other with an extensive corridor, divided into 25 *loggie*, adorned with frescoes by Cornelius illustrative of the history of the fine arts during the middle ages. Cimabue, Giotto, Leonardo da Vinci, Correggio, Titian, Michel Angelo, Albert Dürer, Rembrandt, and Vandyke are here represented, some of them by numerous works. An entire compartment is filled with those of Raphael, and 95 works of Rubens take up the entire space of the central and largest hall of the gallery. Murillo, Poussin, and other Spanish and French painters are also represented. The lower story contains collections of 9,000 drawings by the old masters, including some of Raphael, the drawings of Cornelius for the *loggie*, and 3,000 drawings of South American scenery by Rugendas. The cabinet of engravings comprises about 300,000 works. On the ground floor of the W. wing is a collection of Etruscan and other vases. On the north is the new Pinakothek, completed in 1853, destined for the works of contemporary artists, and comprising 52 rooms in two stories. The upper floor, which contains them, is divided into 5 large central halls, 5 rooms on the south and 14 small cabinets on the north, besides a room at the west with Rottmann's encaustic illustrations of Grecian history and sites. In the central hall are Kaulbach's "Destruction of Jerusalem" and Schorn's "Deluge." It contains also Wilkie's "Reading of the Will." On the ground floor are paintings on porcelain, with copies of the most celebrated works of the picture gallery. In the old picture gallery on the N. side of the royal park is a collection of antiquities and curiosities from different parts of the world. The Leuchtenberg gallery of paintings was removed to St. Petersburg in 1853. The new royal palace (*der neue Königsbau*) is a magnificent and stupendous extension of the old palace. The interior is embellished after the model of the *loggie* of the Vatican. The ground floor consists of state rooms decorated with Schnorr's *Nibelungen*. The kings' and queens' apartments are adorned with paintings respectively from Greek and German poets. Other apartments are devoted to Klopstock, Wieland, Goethe, Schiller, and Tieck. The most interesting part of the palace is the *Festsaalbau*, containing on the E. side of the ball room two rooms for card playing called halls of the

beauties, with portraits of beautiful women of modern times, including Lola Montez. The banquet hall and the halls of Charlemagne, Barbarossa, and Rudolph of Hapsburg are full of fine decorations, the throne room being the most gorgeous of all. Among other royal residences are the Wittelsbach palace and the palaces of Prince Max and Prince Luitpold, the latter formerly known as the Leuchtenberg palace, situated on the Odeon square, opposite to the fine bazaar celebrated for its arcades; and there are several private mansions of remarkable architecture. The Bavarian national museum, completed in 1866, about 500 ft. long and 95 ft. high, contains varied and interesting collections relating to Bavarian antiquity, history, and manufactures, and the walls are decorated with many frescoes of stupendous size. There are various other buildings used as museums and for exhibitions of ancient and modern art, of which latter



The Ruhmeshalle.

Munich contains a greater number than any other place of its size, the so-called crystal palace in the old botanic garden being the most extensive. Some of the city gates, as the *Siegesthor* (the triumphal arch), after the model of the arch of Constantine, and the *Isarthor*, are exceedingly interesting, as well as the Propylæum, a triumphal arch in the old Doric style, with bass reliefs, commemorating the modern Greek war of independence and King Otho. The *Ruhmeshalle* (hall of fame) is the most conspicuous monument of Munich. It is situated on high ground in the Theresienwiese, and consists of a large Doric portico of Bavarian marble, forming three sides of a quadrangle and an open side, in the centre of which rises Schwanthaler's colossal bronze statue of Bavaria, about 100 ft. high, including the pedestal. There are 48 columns with busts of eminent Bavarians. In the tympana are female statues representing Bavaria, the Palatinate, Swabia, and Franconia; and in the frieze are

upward of 90 metopes, adorned with figures of Victory and with reliefs symbolical of the arts and occupations of civilized society. The principal squares and streets are adorned with monuments of Bavarian monarchs, some of them of colossal size, especially the equestrian statute of Louis I. on the Odeon square, and that of Maximilian II., erected in 1874. Goethe, Schiller, Gluck, and other eminent men are likewise honored here by monuments; and among the most recent are those of Liebig and Kaulbach. In the southern cemetery and the adjoining new cemetery are also interesting monuments; the former contains a house (*Leichenhaus*) for funeral exposition of the dead, and the latter has a fine *campo santo*, in the mediæval Lombard style, consisting of a large square enclosure, surrounded by an elegant structure of brick. The opera house of Munich, the concerts in the Odeon and other places, and the conservatory of music are among the best in Germany; the royal school of music was attended in 1874-'5 by 59 female and 45 male pupils. There are several theatres for dramatic performances, the most recent being the *Volkstheater* for popular plays and also for operettas.—There were seven railway stations in 1874. The lines to Paris and Vienna and to Italy form here a main junction, making Munich a great centre of travel, especially in summer, and of increasing trade and industry. In 1874 there were nearly 200 manufactories of various articles. The most celebrated establishments are the breweries; the royal bronze founderies, where Crawford's statues of Beethoven and Washington, and the doors of the capitol at Washington, were cast; the royal glass and porcelain works, Maffei's manufactory of machinery, Mannhardt's of steeple clocks, and Ertl's of technological instruments (which was founded by Reichenbach); Fraunhofer's and Utzschneider's optical works, continued by März and sons; and photographic and xylographic establishments. The staple article of trade is grain, and there are two great annual fairs (*Dulten*). Granaries, a cattle market, and an abattoir have been built near the railway stations, where new establishments spring up in increasing numbers.—Munich was originally a settlement of monks (*Mönche*), whence the name, which was first mentioned early in the 12th century; and Henry the Lion raised the *Villa Municha* to some importance (1158). It became the residence of the dukes of the house of Wittelsbach, and was much enlarged after its destruction by fire in 1327, and endowed with many public buildings by Duke William the Pious (1579-1596) and the duke and elector Maximilian I. (1596-1651). On May 17, 1632, it was taken by Gustavus Adolphus of Sweden, and held for some time. Under Charles Theodore (1777-'99) Munich was greatly improved and enlarged. It was entered by a division of the French army under Moreau in June, 1800, and in October, 1805, by Napoleon, who again visited the city

in January, 1806, on occasion of the marriage of Eugène de Beauharnais. Munich from an inferior town has risen under the fostering care of King Maximilian I. (died in 1825), and particularly under that of his son Louis I., to the rank of an important capital. While still crown prince Louis ordered the building of the Glyptothek and of other public works, and he contributed most powerfully to invest Munich with its present splendor, and continued his exertions for the embellishment of the capital even after his abdication in 1848. Under his son Maximilian II. arose the magnificent street and bridge which bear his name, and many remarkable institutions and works of art. His influence on science was great, and he gave to the university the benefit of the services of Liebig and other eminent men, and encouraged poets and literary men generally. The present king, Louis II., is chiefly interested in music, but proposed in 1874 to endow Munich with a palace and museum after the model of Versailles.

MUNJEET, the commercial name for the root of an East India plant, *rubia munjistia*, or according to some of *R. cordifolia*, used for the same purposes as madder. The roots are of similar appearance to those of madder, but are thinner and much longer, and are found in commerce in bundles 2 or 3 ft. long, and as thick as one's wrist. The coloring principle appears to be alizarine, and, as in madder, this is convertible into garancine, for which purpose the roots are used in Europe. Munjeet dyes a very bright scarlet.

MUNK, Salomon, a French orientalist, born of Jewish parents in Glogau, Prussian Silesia, May 14, 1805, died in Paris, Feb. 6, 1867. He was educated in Berlin and Bonn, and afterward studied the oriental languages in Paris. In 1835 he visited the university of Oxford, with a view of collecting materials for an edition in the original Arabic text in Hebrew letters of the celebrated work of Maimonides, *Moreh nebukhim* ("Guide of the Perplexed"), which he published with a French translation and notes under the title of *Le guide des égarés* (3 vols., 1856-'66). In 1840 he was appointed deputy custodian of the oriental manuscripts in the royal library of Paris. In the same year he accompanied Sir Moses Montefiore and Crémieux to Egypt, where he secured many interesting Arabic manuscripts. In 1852 failing eyesight compelled him to relinquish his office in the library, but, with the assistance of friends, he still pursued his studies. In 1865, though entirely blind, he was appointed professor of the Hebrew, Chaldaic, and Syriac languages in the collège de France. He wrote *Palestine, description géographique, historique et archéologique* (Paris, 1845, included in Didot's *Univers pittoresque*). A portion of his contributions to the *Dictionnaire des sciences philosophiques*, on Arabic and Hebrew philosophy, has been translated into German under the title of *Philosophie und philosophische Schriften der Juden*

(Leipsic, 1852). He also published *Réflexions sur le culte des anciens Hébreux dans ses rapports avec les autres cultes de l'antiquité* (1833), and other works; and prepared a *Cours de langue hébraïque, chaldaïque et syriaque* (1865).

MUNKÁCS, a town of N. E. Hungary, in the county of Bereg, on the Latorcza, 67 m. E. S. E. of Kaschau; pop. in 1870, 8,602. E. of it, on a high rock, is the fortress of the same name, remarkable for numerous sieges, and formerly used by the Austrians as a state prison. Among the prominent prisoners confined there was Alexander Ypsilanti. During the war of 1848-'9 the town and fortress were in the hands of the Hungarians. It has large iron and saltpetre works.

MÜNNICH, Burkhard Christoph, count, a Russian soldier, born in the then Danish duchy of Oldenburg, May 20, 1683, died in St. Petersburg, Oct. 27, 1767. He was the son of a peasant ennobled by Frederick III. of Denmark, and early distinguished himself. He was made a prisoner in the battle of Denain, and sent to Cambrai, where he was very kindly treated by Fénelon. In 1720 he was received with distinction by Peter the Great, who confided to him the execution of the great Ladoga canal. In the reign of Anna he became field marshal and president of the council of state. He reduced Dantzic in 1734. In 1735 he was called to the chief command of the army against the Turks, and gained distinction by his victories. He desolated the Crimea (1736), took Otchakov (1737), defeated the Turks near Stavutshay (1739), seized the fortress of Khotin, and occupied Moldavia. The treaty of Belgrade (Sept. 18, 1739) put an end to the war. Previous to the death of the empress he prevailed upon her to appoint the duke Ernest Biron of Courland as regent during the minority of her successor. But his hope of securing in this manner his own influence was disappointed by the duke taking the power into his own hands, upon which Münnich caused him to be arrested, and transferred the regency nominally to Princess Anna, the mother of Ivan, the young presumptive heir to the crown, while he assumed the reins of government as prime minister of the empire, endeavoring to consolidate his power by an alliance with Prussia. The regent Anna lavished upon him her bounties, but entered into negotiation with Austria and Saxony in order to neutralize Münnich's coalition with Prussia, in consequence of which he relinquished his office (May, 1741). He was on the point of removing to Königsberg, when on the accession of Elizabeth (December) he was arrested by her order and sentenced to death. The sentence was commuted to exile to Siberia, but his estates were confiscated. In 1762 he was recalled by Peter III., who restored his property and position. Catharine II. appointed him in the same year director general of the Baltic ports. His *Ébauche pour donner une idée de la forme du gouvernement de l'empire de Russie* was published at Copenhagen in 1774.

MUÑOZ, Fernando, duke of Rianzares, husband of Maria Christina, ex-queen dowager of Spain, born at Taranco, province of Cuenca, about 1808, died near Havre, Sept. 13, 1873. He was of low birth, and while a private in the royal guards attracted by his personal beauty the admiration of Maria Christina, to whom he was secretly married, Dec. 28, 1833, three months after the death of her husband, King Ferdinand VII. The marriage was publicly solemnized, Oct. 13, 1844, and Muñoz was made duke of Rianzares, a Spanish grandee of the first class, and a knight of the golden fleece. On the marriage of the duke de Montpensier to the sister of Queen Isabella II., Louis Philippe bestowed upon Muñoz the French title of duke of Montmorot. On the expulsion of Maria Christina from Spain in 1854 he went with her to France, and subsequently resided with her at Malmaison and in Paris.

MUNRO, Alexander, an English sculptor, died young in Cannes, France, Jan. 1, 1871. He executed the colossal statue of James Watt at Birmingham, the statue of Queen Mary now in Westminster hall, London, a fountain nymph in Berkeley square, and statues of Hippocrates, Galileo, Davy, and Watt in the Oxford museum. He excelled in medallion portraits in high and low relief, and also in the busts of females and children. His works are generally remarkable for gracefulness, delicacy, and picturesqueness.

MUNSEES, Monseys, or **Minis**, a tribe of American Indians formerly residing on the upper Delaware and the Minisink. In 1663 they aided the Esopus Indians in attacking the Dutch post, and were chastised by Kregier. They claimed all the land from the Minisink to the Hudson, the head waters of the Delaware and Susquehanna, and south to the Lehigh and Conewago. Settlers began to encroach on them early in the 18th century, and they fell back to the Susquehanna. The Moravians drew some to their missions, but the main body were discontented; moving westward through the Iroquois country, they joined the French at Niagara, and were with difficulty gained over by Sir William Johnson. After the fall of the French, some listened to the Moravians, but in the revolution most of the tribe, under Capt. Pipe, retired to Sandusky and joined the English, and even after the war remained hostile, rejecting terms in 1793, and not making peace till 1805. In 1808 a part settled on Miami land at White river. Some years later they joined the Stockbridge Indians near Green bay. Most of the Munsees, under a treaty in 1839, removed to Kansas. They are now nearly extinct, being represented in Wisconsin by a single family of half a dozen souls, and in Kansas by part of a band of 56 Chippewas and Munsees. Their language was an Algonquin dialect closely allied to the Delaware.

MUNSELL, Joel, an American printer, born in Northfield, Mass., April 14, 1808. He went to Albany in 1827, edited and published the "Albany Minerva" in 1828, and was publisher

and editor of the "New York State Mechanic" from 1841 to 1843. He has compiled "Annals of Albany" (10 vols., Albany, 1850-'58); "The Typographical Miscellany" (1850); "Chronology of Paper and Paper Making" (1857); and "Every-Day Book of History and Chronology" (New York, 1858). He has also published "Historical Series" (10 vols.), in great part edited and annotated by himself; "Woodworth's Reminiscences of the City of Troy;" and "Collections on the History of Albany" (4 vols., 1865-'71), and numerous other works. He has at various times been the publisher of papers and periodicals, among which are the following dailies: the "Unionist," "Albany Daily State Register," "Albany Morning Express," and "Statesman." He has made the art of printing, in its history and application, a special study, and his collection of works on the subject, the largest ever made in America, has been in part purchased by the state for the New York state library. In 1872 he published a catalogue with full titles of all the books and pamphlets he had printed down to that date, in 191 closely printed brevier pages, 8vo.

MUNSTER (anc. *Mumhan*), the largest and southernmost of the four provinces of Ireland, bounded N. by Connaught, N. E. by Leinster, and on other sides by the Atlantic, and comprised between lat. 51° 26' and 53° 12' N., and lon. 6° 56' and 10° 26' W.; area, 9,272 sq. m.; pop. in 1871, 1,390,402. In the west are the highest mountains in Ireland, and the south is crossed by long chains of hills. Three fourths of the surface is arable, and one fourth under tillage. The principal rivers are the Suir, Blackwater, Lee, Bandon, Cashen, Maigue, and Fergus, with the estuary of the Shannon, all of which are navigable. The principal lakes are those of Killarney. Except in the rugged uplands of Kerry, Clare, and western Cork, the limestone soil of Munster is excellent. The climate is the most genial in Ireland. Geologically, the province is peculiar in Ireland for the rare appearance of igneous protrusions and the absence of bituminous coal, though possessing perhaps the most extensive anthracite deposit in the British isles. Clay slate is found, and copper abounds all along the S. coast. Lead, silver, iron, alum, black and mottled marbles, plastic clays, and fine ochres are found. The province comprises the counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford.—As a kingdom of the Irish pentarchy, Mumhan was perhaps the most formidable of the five states; it early subjected Leinster to the payment of an annual tribute; its princes successfully opposed and ultimately expelled the Danes, and more than once usurped the sceptre of Tara as sovereigns of the entire island. It was then divided into three principalities, Thomond, Desmond, and Ormond (*i. e.*, North, South, and East Munster), and Cashel was the civil, as it is still the ecclesiastical, metropolis. During the rebellions in the

time of Queen Elizabeth Munster was governed through a local president and council.

MÜNSTER, a city of Germany, capital of the Prussian province of Westphalia and of a district of its own name, on the small river Aa, connected by railway with Düsseldorf, and with the river Ems by a canal, 76 m. N. N. E. of Cologne; pop. in 1871, 24,815. It has fine Gothic buildings, the ground floor of the houses of the main street being provided with arcades to support the upper stories. Among the remarkable public buildings are the cathedral, of the 13th century, and St. Lambert's church. The house of John of Leyden, a fine specimen of the Gothic, still exists in the market place. The treaty of Westphalia, which ended the thirty years' war, was signed here in 1648. The town house was renovated in 1860, and a grand Gothic hall was added. The churches of St. Maurice and St. Leger have also recently been renovated. The Catholic university, which was supplanted in 1818 by the state university of Bonn, has been since reduced to an academy consisting of a theological and a philosophical faculty, which in 1873 had 28 professors and 387 students. There are also a gymnasium, a library of 50,000 volumes, a number of minor Roman Catholic churches and convents, a Protestant church, and a synagogue. The city is the seat of a bishop, and contains several learned societies. The manufactures consist of leather, woollen goods, cloth, linen, sugar, &c.—Münster was known in the time of Charlemagne under the name of Mimi-gardevord. In the 13th century it joined the league of the Hanse towns. The reformation was introduced in 1532, and in 1533-'5 it witnessed the agitations of the Anabaptists. (See ANABAPTISTS.) The former bishopric of Münster was raised in the 12th century to the rank of an imperial principality. Among the prince-bishops was the warlike Galen. (See GALEN.) In 1719 the archbishop of Cologne was invested with the see of Münster. After the peace of Lunéville (1801) the bishopric was secularized, and a part of it ceded to Prussia, which constituted it a principality. This was ceded to France by the treaty of Tilsit in 1807, but restored to Prussia in 1815, with the exception of a small district allotted to Oldenburg.

MÜNTER. **I.** Balthasar, a German clergyman, born in Lübeck, March 24, 1735, died in Copenhagen, Oct. 5, 1793. He studied theology at Jena, was for a time a preacher at Gotha, and became celebrated as a pulpit orator in the German church of Copenhagen, and as the author of the *Bekehrungsgeschichte des Grafen von Struensee* (Copenhagen, 1772; English translation, "A Faithful Narrative of the Conversion and Death of Count Struensee," &c., by the Rev. Mr. Wendeborn, 2d ed., London, 1774). He wrote a series of hymns (1773 and 1774). He was the father of Friederike Brun. **II.** Friedrich, a German-Danish theologian and archaeologist, son of the preceding, born in Gotha, Oct. 14, 1761, died in Copenhagen,

April 9, 1830. He was professor of theology at Copenhagen, and from 1808 till his death bishop of Seeland. He wrote several books on the history of Christianity and of the reformation in Denmark and Norway, and critical works on the cuneiform inscriptions of Persepolis (1800), on similar inscriptions in Sicily (1802), on the religion of the Carthaginians (1816), and various other topics of ancient and mediæval history.

MUNTJAC (*cervulus*, De Blainv., or *styloceras*, H. Smith), the name of several small East Indian deer, which seem to make the transition from the typical *cervidæ* to the musk deer. The horns are small, with only one anterior snag, elevated on pedicels supported by longitudinal ridges on the face; there are large canines in the upper jaw, and large and deep suborbital pits; there are no metatarsal glands nor tufts; the hoofs are triangular, partly united in front by a web, and the false hoofs small and transverse; the hair is thin, shining,



Muntjac (*Cervulus vaginalis*).

and generally unspotted, and the tail is tufted; the form is light and elegant. The few species inhabit the forests and jungles of elevated regions in India and its archipelago, where they are hunted for their excellent venison. The common muntjac or kijang (*C. vaginalis*, Gray) is dark reddish brown, with the lower parts lighter, and a narrow white streak on the front edge of the thigh; it is about $2\frac{1}{2}$ ft. high at the shoulders; in the living animal there are two folds of skin along the sides of the ridges which support the horns, uniting below like a V, but drying after death in three ribbed lines, which suggested to Pennant the name of rib-faced deer. The principal horns are 4 or 5 in. long, at first straight, but curving inward and backward at the top, the anterior antler being about $1\frac{1}{2}$ in.; the pedicels upon which they rest are 3 in. high, covered with skin and hair, so that when the antlers are shed they appear to have straight horns. The food consists chiefly of a kind of sugar cane, and malvaceous and succulent plants. Its speed and agility are

great, the flight being generally in a circle; when brought to bay, it is capable of inflicting severe wounds upon the dogs with its canines; it is sometimes taken in snares, and falls a frequent victim to beasts of prey. It is found in Sumatra and Java. The Nepaul muntjac (*C. moschatrus*, De Blainv.) is bright reddish yellow, the thigh streaked and under the tail white, and the chin and throat whitish. The Chinese muntjac (*C. Reevesii*, Gray) is grayish brown, with the hair short, with paler rings; it has a larger head and tail than the common species, with less red and more bluish tinge, and no white over the hoofs. According to Gray, the earl of Derby had these three species at the Knowsley menagerie; but they so bred together that it became "impossible to discriminate the mules from the original species."

MÜNZER, Thomas, a German mystic, born at Stolberg in the Hartz mountains about 1490, beheaded at Mühlhausen, Thuringia, in May, 1525. After preaching at various places, in 1520 he became pastor of the principal church in Zwickau, Saxony. Here he associated himself with Nikolaus Storch, a weaver, who professed to receive divine revelations. They formed a society among the weavers separate from the church, whose members believed in dreams, visions, and divine inspirations. They soon gained such an influence that Münzer's co-pastor Egranus, who opposed him, was obliged to leave the city. The city council, who for a time had favored Münzer, finally considered his revolutionary views dangerous to the public peace, and imprisoned many of his adherents. Others, among whom was Storch, fled to Wittenberg, where they still professed to receive inspirations, and rejected infant baptism. Münzer went to Bohemia, where he spent six months endeavoring to stir up reformatory movements. Meeting with little success, he went to Thuringia, married, and in 1523 became curate at Allstädt. He was the first to substitute the German language for the Latin in the public prayers and singing. He composed a directory for worship, which was in harmony with his ideas of the reformation. Infant baptism was to be administered in the presence of the church, instead of privately as before, the baptismal liturgy to be in German. Besides his public ministrations, he organized those whom he considered truly regenerated into a separate society, whose members held community of goods and aimed at the overthrow of hierarchy and despotism. Their fanaticism soon led them to destroy the images and burn the chapel in a neighboring place of pilgrimages. The Saxon princes opposed these proceedings; Luther also wrote against them; and Münzer was obliged to leave Allstädt in the summer of 1524. He went to Nuremberg, where he wrote a violent pamphlet against Luther; then to Basel, where he conferred with Ecolampadius; then to Waldshut, where he exerted considerable influence on the men who soon afterward began the peasants' war. Re-

turning to Thuringia, he was settled early in 1525 as curate at Mühlhausen. The city council, who had opposed his settlement there, were deposed, and a new council installed, who were entirely under the control of Münzer and his disciple Pfeiffer. At the outbreak of the peasants' war in southern Germany, Münzer summoned the people to rise and secure their liberty, threatening vengeance on all who resisted them. His pamphlets and letters were signed "Thomas Münzer, a servant of God against the ungodly," or "Thomas Münzer, with the sword of Gideon." Still he himself hesitated to take up arms, until Pfeiffer forced him to do so by alleged inspiration. Led by him, the peasantry of N. W. Thuringia destroyed cloisters, chapels, and the castles of such nobles as refused to engage in the insurrection. For some time they encountered little resistance, until in May the elector John the Constant and Duke George, both of Saxony, the landgrave Philip of Hesse, and other princes rallied their forces against them. The peasants, in their fortified encampment near Frankenhäusen, were assured by Münzer that God would give them the victory; but they were quickly routed in the battle of May 15, and about 5,000 of them were killed. Münzer fled in disguise to Frankenhäusen, but was captured, tortured, and removed to the castle of Heldrungen. From that place he addressed a letter to the people of Mühlhausen, recommending his wife and child to their care. After the capitulation of that city the leaders were sentenced to death, including Münzer and Pfeiffer. Münzer was beheaded in the market place. His numerous writings, all of which are still extant, indicate a more than ordinary power of mind and will, but a strange lack of clear and sound judgment. His language is often forcibly eloquent, but full of coarseness and vulgarity. As he was associated with persons opposed to infant baptism, Münzer has often been considered an Anabaptist, which he never was.—See Melancthon, *Die Historie von Thome Muntzer* (1525); Strobel, *Leben, Schriften und Lehren Thomä Muntzers* (Nuremberg, 1795); Seidemann, *Thomas Münzer* (Dresden and Leipsic, 1842); and Heinrich Leo's essay on him in the *Evangelische Kirchenzeitung* (Berlin, 1856). Theodor Mundt published a historical novel, *Thomas Münzer* (3 vols., Altona, 1841).

MUNZINGER, Werner, a Swiss traveller, born at Olten in 1832, died in November, 1875. He studied at Bern, Munich, and Paris, in 1852 engaged in trade in Egypt, in 1854-'5 resided at Massowah, and for some years explored the land of the Bogos and adjoining territories. He joined Heuglin's expedition in July, 1861; left it in November, in northern Abyssinia, and travelled with Kinzelbach over an unexplored region, ascertaining the course of the river Gash, and returning to Khartoom March 1, 1862. Shortly after he succeeded Heuglin as chief of the German-African expedition. He penetrated to Kordofan, but was unable to

reach Darfoor and Waday, and went to Europe. In 1864 he returned to Massowah, where he became British consul, and rendered valuable services as a guide to the English army during the Abyssinian war. In 1868, after the departure of the English troops, he continued to reside at Massowah as French consul. In the following year, while he was exploring the N. boundary of Abyssinia, an attempt was made upon his life by an assassin, and he was severely wounded. In 1870 he was named governor of Massowah, and from 1872 commanded against the Abyssinians and the African tribes, and was killed in a battle with the Gallas. His principal works are: *Sitten und Recht der Bogos* (Winterthur, 1859); *Ostafrikanische Studien* (Schaffhausen, 1864); *Die deutsche Expedition in Ostafrika* (Gotha, 1865); *Vocabulaire de la langue Tigré*; and contributions to the journal of the London geographical society (1871-'2), and to Petermann's *Mittheilungen* (1872 et seq.).

MURAD. See AMURATH.

MURÆNA. See EEL, vol. vi., p. 447.

MURAT, Joachim, a French soldier, and king of Naples, born at La Bastide-Fortunière, near Cahors, March 25, 1771, executed in Calabria, in the night of Oct. 13-14, 1815. He was the son of an innkeeper, was educated for the church at the college of Cahors, and afterward at Toulouse, and was ordained sub-deacon; but being dismissed from the seminary on account of some youthful follies, he enlisted in a regiment of chasseurs. Cashiered for an outbreak of temper after he had risen through some of the lower grades, he became a waiter at a café in Paris. He soon entered the constitutional guard of Louis XVI., and on its dissolution received a sub-lieutenancy in a cavalry regiment. He was cashiered after Robespierre's overthrow, but was restored, served as aide-de-camp to Bonaparte, and accompanied him to Italy. After Beaulieu's defeat he was sent to Paris with the 21 standards taken from the Austrians, and returned to his post to share in the following Italian campaigns, in which he rose to the rank of brigadier general. In 1798 he went with Bonaparte to Egypt. He was wounded at the taking of Alexandria and in the battle of the pyramids, and was conspicuous in the Syrian campaign, contributing to the victory of Mount Tabor, April 16, 1799, and leading the assault at Acre. In the battle of Aboukir, July 25, he was again wounded, and was rewarded with the rank of general of division. He left Africa with Bonaparte, who had conceived a strong liking for him, and in the *coup d'état* of the 18th Brumaire was at the head of the grenadiers who expelled the council of 500 from their hall at St. Cloud. The chief command of the consular guard and the hand of Caroline Bonaparte were his recompense. At Marengo he was at the head of the cavalry, and in 1801 he commanded the army which invaded the kingdom of Naples and took possession of Elba. He was then

made governor of the Cisalpine republic, and in 1804 of Paris and member of the legislative body; and on the establishment of the empire he received the baton of a marshal and the title of prince. He had a large share in the success of the campaign of 1805 in Germany, and led the cavalry at Austerlitz. In 1806 he was made grand duke of Berg and Cleves. His abilities were strikingly displayed in the battles of Jena, Eylau, and Friedland, and still more in following up the results of these victories. In 1808 he commanded the army which invaded Spain. After the elevation of Joseph Bonaparte to the Spanish throne he went to Italy, where, on Aug. 1, 1808, he was proclaimed king of the Two Sicilies, under the name of Joachim Napoleon. He attempted to ameliorate the condition of his new subjects, encouraged agriculture and industry, improved the public finances, increased the navy, and organized an army 70,000 strong. To vindicate the independence of Naples, he ordered that all foreigners in his service should renounce allegiance to their native country. This edict, aimed especially at the French, called forth an imperial decree declaring that, the kingdom of Naples being part of the French empire, every Frenchman should be of right a citizen of the Two Sicilies. The king then listened to overtures from various European powers, particularly Austria. He durst not, however, disregard Napoleon's summons to take part in the campaign against Russia, and was intrusted with the supreme command of the cavalry. At Borodino he withstood the Russian fire during the whole day. But his energy seemed to falter when the retreat from Moscow commenced, especially after he had been worsted at Vinkovo, Oct. 18, 1812. He however received the chief command of the army when, after the disastrous crossing of the Beresina, Napoleon left it in haste for Paris. But Murat proved unequal to his arduous task; he was anxious to return to Italy, and on Jan. 16, 1813, suddenly took his departure. He resumed his secret negotiations with the enemies of Napoleon, but joined his brother-in-law in the campaign of 1813, and displayed his wonted intrepidity again at Dresden, Wachau, and Leipsic. On his return to Italy he signed, Jan. 11, 1814, a treaty with Austria, by which his kingdom was guaranteed to him, on condition that he should act in concert with the allies at the head of an army of 30,000 men. He accordingly marched against Prince Eugène, viceroy of Italy, and forced him to retreat toward the Adige. But his new allies, having used him, were ready to abandon him, while the Bourbons were insisting on his overthrow at the congress of Vienna. On hearing of this, he sought the support of the Italian patriots, was secretly reconciled with Napoleon, and on the news of the latter's return from Elba marched against the Austrians. He advanced through the Papal States to the banks of the Po; but being worsted at Fer-

rara, he was forced to beat a hasty retreat; fought bravely, but ineffectually, May 2 and 3, at Tolentino; was driven in disorder along the sea and across the Apennines, made an ineffectual stand at San Germano and Mignano, and finally saw his army wasted away by battle and desertion. He now attempted negotiation; but, deserted by even his own emissaries, and the populace of Naples rising in insurrection, he was obliged to fly to Ischia, while his queen took refuge on board an English frigate. From Ischia he went to the shores of Provence, where he arrived on May 25 at night. After the battle of Waterloo, in which he was not allowed to share, he went to Piacenza, where he remained for two months, and then to Bastia, where he landed Aug. 25. Here he prepared an expedition, and on Sept. 28, at the head of 250 men, with seven small transports, he set sail for Naples; his squadron was scattered by foul weather, while he himself with a few companions was driven to the gulf of Santa Eufemia. He landed on Oct. 8 near Pizzo, attempted in vain to rouse the inhabitants of this village in his behalf, was pursued to the mountains by the peasants of the neighborhood, and fought to the last, but finally fell into the hands of his pursuers and was taken to the castle of Pizzo, where he was condemned by a court martial, and shot in one of the rooms of the castle. Being offered a chair and a handkerchief to bandage his eyes, he replied: "I have braved death long and often enough to face it with my eyes open and standing." Léonard Gallois published a *Histoire de Joachim Murat* (Paris, 1828); and the later events of his career have been chronicled by Coletta, *Les six derniers mois de la vie de Murat* (1821), and by Franceschetti, *Mémoires sur les événements qui ont précédé la mort de Joachim I.* (1826).—By his wife Caroline (see BONAPARTE, vol. iii., p. 26), Murat left two sons and two daughters. Both the latter married Italian noblemen, Lætitia Josephine becoming Countess Pepoli, and Louise Julie Caroline, Countess Rasponi. The elder son, NAPOLÉON ACHILLE, born Jan. 21, 1801, after his father's death went with his mother to Haimburg, Austria, came in 1821 to the United States, settled in Florida, married a grandniece of Washington, devoted himself to scientific pursuits, and wrote some essays on the institutions of America. He died April 15, 1847, on his estate near Tallahassee. The younger, NAPOLÉON LUCIEN CHARLES JOSEPH FRANÇOIS, born in Milan, May 16, 1803, after living near his mother till 1825, went to Spain, where he was arrested on suspicion. After his liberation he came to the United States, and married a Miss Fraser, his wife earning a support by teaching. After repeated short stays in France, he returned thither in 1848, and was elected to the constituent and legislative assemblies. He was envoy extraordinary and minister plenipotentiary to Turin in 1849, became senator Jan. 25, 1852, and received the title of prince of the imperial family in 1853. In

1860, when the Bourbons were expelled from Naples, Murat put forth his claims to the throne of the Two Sicilies; but at the instance of Napoleon III. he soon publicly disclaimed his pretensions. In 1870 he was with Bazaine in Metz, and when the city capitulated was made prisoner. He died April 11, 1878. His eldest son, JOSEPH JOACHIM NAPOLEÓN, born in Paris, July 21, 1834, is a colonel in the French army, and in April, 1872, obtained leave to serve four years in the Swedish army.

MURATORI, Ludovico Antonio, an Italian scholar, born at Vignola, in the duchy of Modena, Oct. 21, 1672; died in Modena, Jan. 23, 1750. He was educated at the university of Modena, was ordained priest, and in 1694 was appointed keeper of the Ambrosian library at Milan, where he discovered several inedited Latin and Greek manuscripts, selections from which, with notes and commentaries, he published under the titles of *Anecdota Latina* and *Anecdota Græca*. In 1700 he became conservator of the public archives and principal librarian of Modena. His three great works are *Rerum Italicarum Scriptores* (25 vols. fol., Milan, 1723-'51), *Antiquitates Italicae Medii Ævi* (6 vols. fol., 1738-'42), and *Annali d'Italia* (12 vols., 1744-'9). To publish this vast collection several princes and nobles of Italy subscribed \$4,000 each. The best uniform edition of his works is that published at Venice (48 vols. 8vo, 1790-1810).

MURAVIEFF, an ancient Russian family, originally settled in the former grand duchy of Moscow, and since the latter part of the 15th century in various other parts of the country. **I. Mikhail**, born in Smolensk in October, 1757, died in St. Petersburg in July, 1807. He was tutor of the grand dukes Alexander and Constantine, for whom he prepared a series of essays on history, ethics, and literature. Paul I. appointed him privy councillor, and Alexander I. deputy minister of popular instruction. An edition of his writings was published in 3 vols. (Moscow, 1810; supplement, St. Petersburg, 1815). **II. Nikolai**, born in Riga in 1768, died in Moscow in 1840. After many years of active service in the Russian army and navy, he established near Moscow a private military academy. He took part in the campaign of 1812-'13, concluded the capitulation of Dresden with Gen. Dumas, and was present at the siege of Hamburg. After the peace he resumed his duties at his academy, which in 1816 was raised to the rank of an imperial institution. He conducted it till 1823, from which time till his death he devoted himself to agriculture. He was one of the founders of the Moscow agricultural society. **III. Nikolai**, second son of the preceding, born about 1794, died in November, 1866. He entered the army in 1811, was employed in the military service in the Caucasus, and published in 1822 an account of his travels in Khiva, whither he had been sent on a political mission by Gen. Yermoloff. In 1828 he took part in the Persian war, and

in 1831 in the Polish campaign. He was made lieutenant general, commanded during the siege of Warsaw in September the right wing of the Russian army, and stormed the fortifications of Rakowiec. He commanded the Russian corps which landed in Asia Minor, and arrested the advance of Ibrahim Pasha toward Constantinople after his victory at Konieh, and then visited Mehemet Ali in Cairo. He superintended the construction of the fortifications of Sebastopol, but fell into disgrace in 1838, for having in a sham fight made prisoners the emperor Nicholas and his staff, and lived in retirement in Moscow till 1848, when he became a member of the board of war, and afterward commander of the corps of grenadiers in the imperial guard. In 1855 he was in command of the army of the Caucasus as general of infantry and governor of Transcaucasia, and conducted the siege of Kars with great energy and ability from the beginning of June till Nov. 27, 1855, when the fortress was compelled to capitulate. Muravieff was rewarded with the title of prince, but, being unpopular with his fellow officers and the court, spent his last years in retirement. **IV. Mikhail**, brother of the preceding, born in 1796, died in 1866. At the age of 15 he was a teacher in the military school established by his father. In 1813 he took part in the campaign against the French, and on his return continued his military studies, and about this time translated Garnier's *Géométrie analytique* into Russian. In 1823 he became colonel in the army; in 1831 military governor of Grodno and subsequently of Kursk; in 1842 chief director of the topographical corps and major general; and in 1850 a member of the council of the empire. He was soon after chosen president of the geographical society, and sent an important scientific expedition to Siberia. In 1857 he became president of the department of apanages, in which office he did much to promote the advancement of agriculture. In 1863 he was appointed governor general of Wilna, and his rigorous rule during the Polish insurrection was not wholly approved by Alexander. In 1866 he was president of the commission to discover the accomplices of Karakozoff in the attempted assassination of the emperor. **V. Nikolai**, born in 1810, served a long time in the Caucasus, and in 1847 was made lieutenant general and governor general of eastern Siberia. He concluded the treaty of May, 1858, by which China ceded to Russia the Amoor territory, for which service he was created Count Amurski. In 1859 he concluded at Yedo a treaty with Japan favorable to Russia, and in 1861 was made a member of the council of the empire. **VI. Alexander**, son of the first mentioned Nikolai, born in 1792, died in 1864. He was implicated in the revolutionary movement of 1825, and was exiled to Siberia. In 1853 he was restored to the army, and during the Crimean war he was made major general. In 1855 he was governor of Nizhni

Novgorod, and he took an active part in the emancipation of the serfs. At the time of his death he was a lieutenant general and a member of the senate.—A branch of the family has adopted the name of MURAVIEFF-APOSTOL, from the marriage of one of them in the 18th century with a daughter of a Cossack hetman named Apostol. Noticeable among this branch is IVAN (born in 1769, died in 1851), who translated Sheridan's "School for Scandal," Horace's "Satires," and Aristophanes's "Clouds" into Russian, and published in 1822 an account of his archaeological explorations in Taurida. He officiated as ambassador at several European courts, and was eventually made a privy councillor and senator. His son SERGEI was a conspicuous leader of the conspiracy of 1825, and after the unsuccessful attempt in St. Petersburg he proclaimed the grand duke Constantine as emperor and took possession of the town of Vasilkov. He was defeated and severely wounded near Ustinovka, Jan. 15, 1826, removed to St. Petersburg, and executed July 25. His brother Ippolit was killed, and another was banished to Siberia.

MURCHISON, Sir Roderick Impey, a British geologist, born at Tarradale, Ross-shire, Scotland, Feb. 19, 1792, died in London, Oct. 22, 1871. He obtained a commission in the army in 1807, served during a portion of the peninsular war, and was employed on the staff of his uncle Sir A. Mackenzie in Sicily. He retired with the rank of captain of dragoons in 1815, married a daughter of Gen. Hugonin, and through her influence and the advice of Humphry Davy devoted himself to natural science. In 1825 he read a paper before the geological society "On the Geological Formation of the Northwest Extremity of Sussex, and the adjoining parts of Hampshire and Surrey." In 1827 he explored the highlands of Scotland, and in 1828 accompanied Lyell in a tour through France, studying the volcanic regions of Auvergne and the formation of valleys. He next undertook, with Prof. Adam Sedgwick, a systematic examination of the lower fossiliferous rocks of England and Wales. He partially remodelled the classification of the palæozoic strata, and in 1832 first applied the term Silurian to a series of rocks intermediate between the Cambrian and Devonian formations. Murchison recognized two main divisions as constituting the Silurian system, an upper and a lower, the latter of which he believed to lie imposed upon the upper Cambrian of Sedgwick. Subsequent researches have shown that the geological sections of Murchison, upon which his system was based, were in great part erroneous, and that his lower Silurian was identical with the upper Cambrian. This discovery gave rise to a long and acrimonious controversy between Sedgwick and Murchison and his partisans; but later researches, by comparing the justice of Sedgwick's views and the correctness of his determinations, are again bringing his nomenclature into use. (See GEOLOGY, and SEDGWICK,

ADAM.) In 1839 appeared "The Silurian System," a revised edition of which was published in 1854 under the name of "Siluria." By invitation of the emperor Nicholas, Murchison, accompanied by De Verneuil and Keyserling, undertook a geological survey of Russia; and between 1840 and 1844 he explored the southern provinces of the empire, and a large portion of the Ural mountains, besides sections of Germany, Poland, Sweden, and Norway. He now conceived the idea of uniting the upper series of the palæozoic rocks, consisting mainly of the lower new red sandstones and the subjacent magnesian limestones, into a single group, for which he proposed the name Permian, from the prevalence of this formation in the ancient district of Perm. The results of the Russian expedition were published in a treatise "On the Geological Structure of the Northern and Central Regions of Russia in Europe" (London, 1841), and in "Geology of Russia in Europe and the Ural Mountains" (1845). In 1856 he published a geological map of Europe, and in 1861, conjointly with Geikie, one of Scotland. He was created grand cross of the Russian order of St. Stanislas in 1845, knighted in 1846, and made a baronet in 1866. In 1846 he was president of the British association. On the death of Sir Henry T. De la Beche in 1855, he became director of the British geological survey, a post which he resigned shortly before his death. Murchison was one of the founders of the royal geographical society in 1830, was elected its president in 1843, was several times reelected, and held the office from 1862 until his death. It was chiefly through his influence that Dr. Livingstone was enabled to prosecute his researches in South Africa. He received the degrees of D. C. L. and LL. D. from the universities of England, and was an associate of nearly all scientific institutions. He opposed the evolution theory of Darwin, stanchly adhering to the doctrine of immutability.—See "Memoirs of Sir Roderick I. Murchison," by Archibald Geikie (2 vols., London, 1874).

MURCIA. I. An ancient kingdom of Spain, bounded N. W. and N. by New Castile, N. E. and E. by the province of Valencia and the Mediterranean, S. E. and S. by the Mediterranean and Granada, and W. by Jaen; area, 10,450 sq. m.; pop. in 1870, 660,040. The coast from the confines of Granada to Cartagena is rocky and precipitous, but eastward from that port it is in general low and sandy. The surface is mostly mountainous. The principal ranges are the Sierra de Sagra, the Sierra de Alcaraz, and the Sierra de Segura. The chief rivers are the Segura, Mundo, and Sangonera. Where it can be irrigated the soil is often of exuberant fertility. The productions are wheat, barley, maize, rye, rice, flax, vegetables, and superior fruit, particularly pomegranates, melons, oranges, and lemons. Lead, silver, sulphur, and nitre are found. The climate is mild, and snow and ice are almost unknown. Murcia was conquered by the Moors in 712, and made

a dependency of the caliphate of Cordova. In 1239 Mohammed Ali or Hudiel made it an independent kingdom, but within a few years it was united to Castile. It was divided in 1833 into the provinces of Murcia and Albacete. The chief port is Cartagena. **II.** The modern Murcia comprises the southern part of the ancient province, bounded S. E. by the Mediterranean and drained by the Segura and its tributaries; area, 4,478 sq. m.; pop. in 1870, 439,067. The S. and N. W. portions are mountainous, and much of the soil is sterile, but near the rivers are some rich tracts whose prolific vegetation has acquired for them the name of *huertas* or gardens. In the southeast are mines of lead and silver. **III.** A city, capital of the ancient and modern province, on the N. bank of the Segura, 220 m. S. E. of Madrid; pop., including suburbs, about 110,000. It is near the centre of the beautiful valley called Huerta

MURDER, a crime defined by Blackstone as the unlawful killing of "any reasonable creature in being, and under the king's peace, with malice aforethought, either express or implied," by a person of sound memory and discretion. The element of "malice aforethought" is of the essence of murder. The greatest difficulty in determining whether a homicide be murder is generally connected with the question of malice. It is quite certain that the malice need not be malice against the individual killed; for if one maliciously shoots at a person with intent to kill him, and missing him kills another, it is quite as much murder as if he had executed his intention. Nor indeed need it be directed against any person in particular. If one shoots into a crowd without knowing a person there, and kills one of them, it is murder; for such a criminal is regarded as having malice against the world, or in the words of the old

cases, he is *hostis humani generis*. Still there must be malice; for probably no kind or degree of mere carelessness or negligence would make a case of homicide one of murder. So if the death were caused by mere mistake, whether of law, of fact, or of the person, it would not be murder, unless it would have been murder if the law or fact or person had been what they were supposed to be. The principal exception to the necessity of proof of actual malice would seem to be where the death was caused without intention, but by the commission of or in attempting a felony. This



Murcia.

de Murcia, and was formerly fortified. It is the residence of the bishop of Cartagena, and has 11 parish churches, a theological seminary, a college, several other learned institutions, an academy of music, a public library, and a botanic garden. The cathedral tower is very imposing, consisting of three quadrangular stages, each diminishing perimetrically and crowned with a dome. It is ascended to the top of the first stage by an inclined plane 320 paces long and of gradually increasing steepness. From the first stage a narrow stairway of 210 steps leads to the summit of the tower. The chief manufactures are earthenware, leather, coarse linen, silk thread, silks and baskets, mats, cordage, and sandals. Murcia was founded by the Moors, and during their supremacy was one of the seven metropolitan cities of Spain. It submitted to the Spaniards in 1243. In 1810 it was plundered by the French under Sebastiani.

distinction is so nice, that while, if one shooting at his neighbor's fowls with intent to destroy them shoots him by accident, this would not be murder, yet shooting them with intent to steal, and with the same result, would, it is said, be murder. Drunkenness has been considered in reference to manslaughter, and a somewhat similar rule is held as to murder; that is, intoxication, if it negatives the supposition of malice, would prevent the crime from being murder, unless it was a state of temporary insanity, purposely brought on that under it murder might be committed safely, in which case it would not be regarded as any excuse whatever.—Cases of compulsion have been somewhat considered; and it has been generally held that strict and actual compulsion was an excuse, but nothing less. If a captive on board a pirate were compelled to act with the crew in committing murder by threats of immediate death, this compulsion would undoubtedly be

a sufficient excuse; but nothing less than a compulsion of this character would have this effect; as no command from a master, and no threat of a whipping, would be any excuse at all for a servant. But a jury, who can now judge of the law as well as the fact in criminal cases, if they were satisfied, from the evidence of command or threat, of the absence of all malice, either general or individual, would seldom render a verdict of murder. So if a crime be committed by a wife in presence of her husband, it is presumed by the law that she did the act under his coercion, and she is not herself guilty. But murder and treason are exceptions to this rule; and here it is said that no proof of actual constraint by the husband operates as an excuse.—It seems quite well settled, as a general rule, that if many are confederate in any unlawful act, and some one of them, in doing the act, commit a murder, all are guilty; as if several conspire to seize a vessel forcibly and run away with her, and one opposing them is killed in the conflict, all are guilty of murder, in law, who are present, aiding and abetting in the unlawful act. No consent or even request of the party killed is any excuse whatever. At common law, counselling of suicide, if it causes the suicide, is murder. So if two persons agree to commit suicide together, and use means which take effect only on one, it is murder in the survivor, provided he was present when the act was committed, as otherwise he is only an accessory before the fact. In such a case, however, the jury would be very likely to treat the case as manslaughter. If one, by working on the fears of another, or by mere unkind usage, put one into "a passion of grief or fear" whereof he or she, being perhaps at the time in feeble health, dies, this, says Hale, though murder or manslaughter in the sight of God, is not so at common law. Most later writers have adopted this view, which is said to be in accordance with the codes of France and of Scotland; while in some countries the law is held to be, as an English judge in a recent case declared it to be in England, that one is guilty if he cause death by force "applied either to the body or the mind." We consider Hale's view as being that of the common law, and of the prevailing law of the United States. It was a rule of the common law, that it was murder to procure the conviction and execution of an innocent person charged with a capital crime by perjury. Now, however, we are satisfied that both in England and in the United States such a crime would be punished only as an aggravated case of perjury.—The question has arisen, whether one can be indicted in a state or country for murder, if the criminal did actually in that state give the fatal blow, or fire the fatal shot, but the injured party went into another state or country and died there. The weight of authority, and we think of reason, is that no such indictment can be maintained. No country can punish a crime committed abroad, or partially

abroad, unless by its own municipal provisions, applied to its own citizens. In accordance with this view, the statute of the United States against "murder on the high seas" has been held inapplicable to a case where a fatal blow was given with malice on the high seas, but the wounded person reached the shore and died on land.—An important question has exercised the courts, both of England and the United States, in respect to the evidence of murder and the burden of proof. Some courts have held that if the government proved the death alleged, and that this death was caused by the prisoner, the burden of proof then shifted, and it lay on the prisoner to prove want of malice, or accident, or self-defence, or any other justification. Other courts hold the contrary, and we are satisfied that in cases of murder, the actual and practical rule whereby the fate of the prisoner is determined should be and is that the burden of proof remains on the government until they have proved their whole case, which includes the killing and the intent, or "the malice aforethought," without which there can be no murder. This evidence may undoubtedly be indirect or circumstantial, and must be so generally, because malice is a condition of mind and purpose. But it would not be enough in modern times to charge A with the murder of B, and rest the charge upon the mere proof that A killed B, unless there were something in the time, place, or circumstances of the killing, or of the conduct of the prisoner in reference to it, which brought home to a jury a belief that he was moved by malice aforethought.—In some of the states, although not generally, the crime of murder has been divided into degrees; and where capital punishment is retained, only murder in the first degree is punishable with death.—It should be added, that whenever a person is indicted and tried for murder, it is competent for the jury to bring in a verdict of manslaughter.

MURDOCH, James Edward, an American actor, born in Philadelphia, Jan. 25, 1811. He first appeared on the stage in the Arch street theatre, subsequently played in various southern cities, and in June, 1838, appeared in the Park theatre, New York, in leading characters, in support of Ellen Tree. He withdrew from the stage in 1842 to devote himself to the teaching of elocution, and also gave a series of lectures on Shakespeare's characters in Boston, Philadelphia, and New York. On Oct. 20, 1845, he appeared as Hamlet in the Park theatre, New York, and subsequently made professional tours in Canada, California, and England, appearing in the Haymarket theatre, London, in 1856. In 1858 he retired to a farm in Lebanon, Ohio. During the civil war he gave elocutionary entertainments throughout the north in aid of the sanitary commission, devoted himself to the care of sick and wounded soldiers, and served for a while on the staff of Gen. Rousseau. Since then he has resided in Philadelphia as a professional elocutionist. In con-

junction with William Russell he published "Orthophony, or Culture of the Voice" (12mo, Boston, 1845).

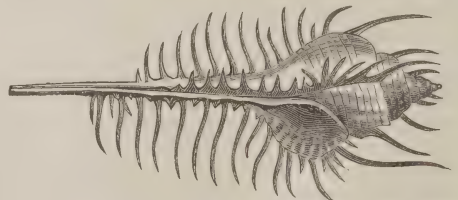
MURDOCK, James, an American clergyman, born in Westbrook, Conn., Feb. 16, 1776, died in Columbus, Miss., Aug. 10, 1856. He graduated at Yale college in 1797, was ordained as a Congregational minister in 1801, and in February, 1802, was settled in Princeton, Mass. In 1815 he became professor of ancient languages in the university of Vermont, and in 1819 of sacred rhetoric and ecclesiastical history in the theological seminary at Andover, Mass. In 1828 he removed to New Haven, where he devoted himself to the study of ecclesiastical history, the oriental languages, and philosophy. His principal works are: a translation from the German of Münscher's "Elements of Dogmatic History" (New Haven, 1830); a translation of Mosheim's "Institutes of Ecclesiastical History," with copious notes (3 vols., New Haven, 1832; revised ed., New York, 1839); an edition of Milman's "History of Christianity," with a preface and notes (New York, 1841); "Sketches of Modern Philosophy, especially among the Germans" (Hartford, 1842); a "Literal Translation of the whole New Testament from the Ancient Syriac Version," with a preface and marginal notes (New York, 1851); and a translation from the Latin of Mosheim's "Commentaries on the Affairs of the Christians before the time of Constantine the Great" (2 vols., New York, 1852). He also published several sermons, one of which, on the atonement (1823), attracted great attention. He was a member of many learned societies, and in 1819 received the degree of D. D. from Harvard university.

MURE, William, a Scottish author, born at Caldwell, Ayrshire, July 9, 1799, died in London, April 1, 1860. He was educated at Westminster school and the university of Edinburgh, and completed his studies in Germany. He published "Remarks on the Chronology of the Egyptian Dynasties" (1829), "A Dissertation on the Calendar of the Zodiac of Ancient Egypt" (1832), "Journal of a Tour in Greece" (1838), and "Critical History of the Language and Literature of Ancient Greece" (5 vols., 1850-'57), which was left unfinished. He represented Renfrewshire in parliament from 1846 to 1855, and in 1847-'8 was lord rector of the university of Glasgow.

MURET, Théodore César, a French author, born in Geneva, Jan. 24, 1803, died at Soisy, near Paris, in July, 1866. He was descended from French Protestant refugees, studied at Geneva and Rouen, took his degree of advocate at Paris in 1829, and devoted himself to journalism in the legitimist interest, and to dramatic and general literature. The best known of his vaudevilles, in which he had collaborators, are *Le médecin de campagne* (1838) and *Le docteur Saint-Brice* (1840). He published novels and many pamphlets, some of which, especially *La Vérité aux ouvriers, aux paysans, aux soldats*

(1849), had an enormous circulation. His other works comprise *Histoire de Paris* (1837; 2d ed., 1851); *Souvenirs de l'ouest* (1838); *Les grands hommes de la France* (2 vols., 1838); *Histoire de l'armée de Condé* (2 vols., 1844); *Histoire des guerres de l'ouest* (5 vols., 1848); and *L'Histoire par le théâtre* (3 vols., 1864-'5).

MUREX, a genus of gasteropod mollusks, found in almost all temperate and tropical seas at depths varying from 25 to 60 fathoms. About 200 living species are known, and 160 fossil, chiefly belonging to the eocene formation. Some of the species are remarkable for their very long and slender beak, along which the canal is partly closed. The shells are ornamented with three or more longitudinal ridges, from which sometimes proceed rows of long pointed spines, which are removed by the animal when they interfere with its growth. The murices are particularly interesting from their having been the source of the famous Tyrian dye. It is said that heaps of broken shells of the *M. trunculus*, and caldron-shaped holes in the rocks, may still be seen on the Phœnician shore; and on the coast of the Morea there is evidence that the *M. brandaris* was anciently used for the same purpose of collecting the purple secretion of which the dye was composed. The ancients bruised the smaller shells in mortars, but took out the animal from the larger ones. Several species of *purpura* also produce a fluid which gives a dull crimson dye. An imitation of the purple dye prepared from uric acid, treated by nitric acid and combined with ammonia, was discovered by Prout in 1818, and afterward named by Liebig and Wöhler murexide. It is now produced from guano, and is used for the dyeing of foulard silks. The coloring fluid is secreted by a special gland situated on the mantle; in *murex* and *purpura* it is colorless when secreted, but on exposure to the sun becomes first yellowish, and finally violet, passing through the tints formed by the mixture of yellow, blue, and red. The *M. tenuispina* of the Moluccas is



Murex (*Murex tenuispina*).

one of the handsomest species, 5 to 6 in. long. A handsome species is abundant on the Central American coasts.

MURFREESBORO, a city and the capital of Rutherford co., Tennessee, situated near the centre of the state, on an elevated and healthy plain bounded E. by the Cumberland mountains, on the Nashville and Chattanooga railroad, 32 m. S. E. of Nashville; pop. in 1870, 3,502, of

whom 1,805 were colored. It is regularly laid out, lighted with gas, and well built, principally of brick. The court house is large and handsome, and stands in the centre of the public square. Being surrounded by a fertile and thickly settled country, the city has an important trade, especially in cotton and grain. It contains two national banks, a manufactory of cedar ware, an extensive saw mill, a cotton gin manufactory, a pork-packing establishment, several cotton gins and grist mills, carriage factories, &c. There are four public school departments, two for white and two for colored children, a private school, a female institute, the Soule female college under the patronage of the Methodists, two weekly newspapers, and ten churches (four colored). Murfreesboro was the seat of Union university, founded by the Baptist educational society in 1848, but now suspended. In the immediate vicinity of the city are the Tennessee central fair grounds, occupying 20 acres handsomely improved. Near by are a large national cemetery, beautifully laid out and decorated, containing a monument to those who fell in the battle of Murfreesboro, and a confederate cemetery.—The town was established in 1811, and incorporated in 1817. The state legislature met here from 1819 to 1825. Early in the summer of 1862 it was occupied by a small Union force. On July 13 it was captured by the confederates under Forrest, a Michigan regiment being made prisoners. Soon after Gen. Bragg made it the centre of his operations in Tennessee, having about 50,000 men, of whom nearly a third were cavalry. Late in November Gen. Rosecrans moved from Nashville with about 40,000 infantry and 3,000 cavalry, and took up a strong position near Murfreesboro. For nearly a month the two armies lay watching each other. At length Bragg sent the greater part of his cavalry to operate against the lines of communication of Rosecrans, who thereupon took the offensive. Skirmishing began on Dec. 26, but the main engagements took place Dec. 31, 1862, and Jan. 2, 1863. The action of Dec. 31 was severe but indecisive. On Jan. 2 the confederate forces made one more vigorous attack. Bragg was finally repelled, and on the 4th he abandoned Murfreesboro, of which Rosecrans took possession next day. He fortified the place, and made it his depot of supplies, remaining there for six months, after which he advanced toward Chattanooga, whither Bragg had fallen back. The battle of Murfreesboro, commonly called that of Stone River, was, in proportion to the numbers engaged, one of the most bloody of the war. Bragg says he had 35,000 men engaged, and that the Union force was about 70,000. Rosecrans puts his force at 43,000, estimating that of the confederates at 62,000. The Union loss was 1,553 killed, about 7,000 wounded, and 3,000 prisoners. Bragg puts his entire loss at about 10,000.

MURGER, Henry, a French author, born in Paris in 1822, died there, Jan. 28, 1861. He had only limited opportunities of education, and became a lawyer's clerk, and afterward secretary of Count Tolstoi, a Russian resident of Paris. He wrote in prose and verse, and led a precarious life as a journalist and *littérateur* till 1848, when his *Scènes de la vie de Bohême*, describing his own experiences, made him famous. He dramatized it in 1851, with Théodore Barrière, with considerable success. Among his subsequent works are poems, plays, novels, and new series of his sketches of "Bohemian" life in Paris, including *Le pays latin, scènes de la vie d'étudiant* (1852).

MURIATIC ACID. See HYDROCHLORIC ACID.

MURILLO, Bartolomé Estéban, a Spanish painter, born in Seville, where he was baptized Jan. 1, 1618, died there, April 3, 1682. At an early age he entered the studio of his uncle Juan de Castillo, and soon began to sketch the ragged, sunburnt children of the street, and to paint pictures of Spanish low life. The removal of his master in 1640 to Cadiz threw Murillo upon his own resources, and he painted several coarse and hurried pictures to sell in the public fairs of Seville. To procure means to enable him to study in Madrid, he executed pictures for the colonial market, which were distributed throughout the Spanish American possessions, comprising the greater part if not the whole of his paintings in churches and monasteries of the new world, and the number and value of which have been greatly exaggerated. With the money thus acquired he went in 1643 to Madrid, and was kindly received by Velasquez, who admitted him to his academy and introduced him to the royal galleries of the capital and the Escorial, where during the next two years he copied the works of Titian, Rubens, Vandyke, Ribera, and Velasquez. After his return to Seville, his first important commission was from the friars of the convent of San Francisco, for the cloisters of which he painted 11 large pictures in the *frio*, described as dark, with a decided outline, which was the first of the three styles usually distinguished in his works. The cloisters were burned in 1810, and the greater part of the pictures carried off by Marshal Soult. Commissions flowed in upon him, and in 1648 he married an Andalusian lady of wealth and rank. Soon afterward he adopted his *cálido* or second style, warm, and with improved coloring, some of the earliest examples of which are "Our Lady of the Conception," the "San Leandro" and "San Isidro," the "Nativity of the Virgin," and the "St. Anthony of Padua." From the last, in the cathedral of Seville, the figure of the saint was cut out and stolen in 1874, but recovered in New York in January, 1875. In 1660 Murillo, in conjunction with Valdes Leal and the younger Herrera, founded an academy of art in Seville, of which he was president till his death. To this period may be ascribed his four large semicircular pictures, executed for

the church of Santa Maria la Blanca in Seville. Two of these, representing the legend of the dream of the Roman patrician which led to the building of Santa Maria Maggiore in Rome under Pope Liberius, now hang in the academy of San Fernando in Madrid. They are in the *vaporoso* style, described as misty, vaporous, and blending, and are magnificent specimens of the artist's powers. Between 1660 and 1674 was executed, for an almshouse outside the walls of Seville, a celebrated series of pictures. Five of these, "Abraham receiving the three Angels," "The Return of the Prodigal Son," "The Healing of the Cripple," "St. Peter released from Prison by the Angel," and "St. Elizabeth of Hungary," were carried off by Soult. The first two were sold to the duke of Sutherland; the third was bought by Mr. Tomline, an English collector, for 160,000 francs; the fourth is in the Hermitage in St. Petersburg; and the fifth, with the two pictures from Santa Maria la Blanca, is in the academy of Seville. Of the original series still remaining in the almshouse the chief are "Moses striking the Rock," "The Charity of San Juan de Dios," and "The Miracle of the Loaves and Fishes," works conceived with all the artist's strength in the maturity of his powers. Subsequent to 1675 he painted a series of about 20 pictures for the convent of the Capuchins in Seville, of which 17 are now in the museum of the city. One of the best of these, "The Charity of St. Thomas of Villanueva," presents many striking studies of street nature, and was called by the artist *su lienzo*, "his own picture." Another celebrated picture formerly in the chapel of the monastery, representing the Virgin and child, is said to have been painted on a *servilleta*, whence it was called the "Virgin of the Napkin." He subsequently executed fine series of pictures for the *hospital de los venerables* and the Augustinian convent of Seville, and a multitude of miscellaneous works, generally of a religious character. Preëminent among them were those devoted to the illustration of the immaculate conception of the Virgin; and from the frequency and fondness with which he represented the subject, he was called "the painter of the conceptions." A memorable example of this style of picture is the "Immaculate Conception," purchased at the sale of Marshal Soult's collection in 1852 by the French government for 635,000 francs, and now in the Louvre, in which the Virgin appears in a state of ecstatic beatitude, borne aloft in a golden ether to heaven by a multitude of cherubs, who are painted with inimitable sweetness. A few similar works, attributed to him, are owned in the United States. His remaining works are distributed among the royal and private galleries of Europe. The Louvre contains a considerable number; the Pinakothek in Munich has two or three admirable specimens of his beggar boys; Dulwich gallery has six pictures, including the celebrated "Flower Girl;" and the national gallery

of London has his "Holy Family" and "Infant St. John and the Lamb." The Hermitage in St. Petersburg has 18 of his pictures. His "Little Shepherd" (*El pastorcico*), presented by Queen Isabella to Guizot, was sold by him at auction in May, 1874, for 120,000 francs. Such, however, has been the mania of late years for his works, that his name has been applied indiscriminately to productions utterly unworthy of his pencil, and many of the pictures of peasants and beggars attributed to him are supposed to be by his followers or pupils. A short time before his death Murillo went to Cadiz to paint the "Espousals of St. Catharine" over the high altar in the Capuchin church of that city, and while engaged upon the work stumbled and fell from the scaffolding, receiving an injury which proved fatal. He was buried in the church of Santa Cruz in Seville, before a picture of the "Descent from the Cross" by Pedro Campana, which he had greatly admired in his life. The French in 1810 levelled the church to the ground, and "cast out the ashes of Murillo to the winds." Murillo was essentially a painter of religious subjects, and excelled as a colorist. As a landscape painter his scenery is often conventional and merely accessory. He also painted a few portraits.—See Ford's "Handbook of Spain," Stirling's "Annals of the Artists of Spain," Head's "Handbook of the Spanish School," and Cunningham's "Life of Wilkie."

MURNER, Thomas, a German satirist, born in Strasburg, Dec. 24, 1475, died probably in Heidelberg about 1536. He studied at the principal universities of Europe, lost a place in the conventual Latin school of Strasburg by his invective against Wimpfeling, and led afterward an unsteady life, preaching for some time at Frankfort and other places, but generally incurring the displeasure of his congregation by his coarse personalities. He was successively expelled from Freiburg, Treves, and Venice. He resumed his functions in the conventual school of Strasburg in 1519, and became one of the most virulent opponents of the reformation. In 1523 he went to England, invited by Henry VIII., but troubles in his convent compelled him to return. Some of his writings against the reformation had already been burned by order of the Strasburg magistracy; and to elude the vigilance of the authorities he established a press of his own, which was destroyed by a mob, together with his house, and he was compelled to flee to Switzerland, whence he was afterward expelled. In 1506 he had been crowned as poet laureate by the emperor Maximilian, and he had justified the distinction by his *Narrenbeschwoörung* and *Der Schelmen Zunft* (1512). He wrote *Chartiludium logice*, &c. (Cracow, 1507), and other Latin works; prepared a German version of Virgil and other translations; and was also regarded as the editor of *Eulenspiegel*. But he is chiefly remembered by his writings against Luther and the reformation. His most

celebrated satirical work is entitled *Von dem grossen lutherischen Narren* (Strasburg, 1522).

MURPHY, Arthur, a British dramatist, born at Clooniquin, county Roscommon, Ireland, Dec. 27, 1727, died in London, June 18, 1805. He was educated at the Roman Catholic college of St. Omer, spent some years in a banking house in London, and in 1756 was admitted to Lincoln's Inn. He conducted for two years a weekly paper, the "Gray's Inn Journal." In 1758 appeared his first dramatic production, "The Upholsterer," a farce, followed by "The Orphan of China," "The Way to Keep Him," "All in the Wrong," "The Citizen," "The Old Maid," &c. In 1762 he was called to the bar, but at the end of 15 years quitted his profession, and devoted the remainder of his life to literary pursuits. In 1786 appeared an edition of his works in 7 vols. 8vo, containing, in addition to the dramatic pieces above mentioned, his "Three Weeks after Marriage," "Zenobia," "The Grecian Daughter," &c. Some of his plays long kept possession of the stage. In 1792 he published an essay on the life and genius of Dr. Johnson, in 1793 a translation of Tacitus in 4 vols. 4to, and in 1801 a life of Garrick. His translation of Sallust, completed by Thomas Moore, appeared in 1807. At various times in his life he engaged in political controversies, and edited journals opposing Mr. Fox, the first Lord Holland, and Wilkes's "North Briton." In his old age he was made a commissioner of bankrupts, and for the last three years of his life he received a pension of £200. A life of Murphy by Jesse Foot was published in 1811.

MURRAIN (Span. *morriña*, from Lat. *mori*, to die; or Gr. *μαραινειν*, to waste, to destroy), a term applied to various fatal contagious epizootics, and therefore an equivalent to some extent of the Greek *λοιμος*, Latin *pestis*, and English *pest* and *plague*. The diseases most commonly included under this term are Russian cattle plague, apthous fever, lung fever, and malignant anthrax. The first three are true plagues, spreading widely by contagion and irrespective of the influences of season, climate, &c.; the fourth appears to arise from unhealthy local conditions, but in hot, damp, insalubrious years will assume an unusual virulence and spread far beyond its native limits. From the earliest ages these affections have spread widely and disastrously in the track of belligerent armies, being propagated in their herds of supply; and thus on the occasion of any great European war the ravages of pestilence and famine have been superadded to the horrors of fire and sword. The yearly losses of individual countries in such cases were to be counted by hundreds of thousands of stock, while the losses to the continent by a single epizootic are computed at hundreds of millions.—1. *Russian Cattle Plague*, or *Steppe Murrain* (Ger. *Rinderpest*, Fr. *la peste bovine*, &c.), is a contagious fever of cattle and other ruminants, supposed to arise spontaneously in the Kirghiz steppes

and the government of Kherson in southern Russia, characterized by congestion, excessive growth and degeneration of epithelium, sloughing, and ulceration of all the mucous membranes, but especially of those of the alimentary canal. It has spread over western Europe in connection with every great general war, from the irruption of the Huns, about A. D. 375, to the recent Franco-German contest, after which both belligerent countries suffered severely. After the taking of Paris the plague anticipated the famished inhabitants in destroying the cattle set apart for their relief, and out of 10,000 to 12,000 reserved for the troops 800 died in one night. From 1711 to 1769 it destroyed over 200,000,000 head of cattle in Europe; from 1793 to 1796, 3,000,000 to 4,000,000 in Italy; in 1842 it killed 300,000 head of cattle in Egypt, and died out two years later for want of more animals to destroy; and in 1865-'66 it proved fatal to about 500,000 head in Great Britain within 18 months. Excepting in its supposed birthplace on the steppes, this malady is propagated only by contagion, and in ordinary cases passes over exclusively breeding districts into which no strange cattle nor their products are brought. Thus Belgium almost entirely escaped in the recent French outbreak. Austria and Prussia habitually protect themselves by a supervision and quarantine on their frontiers, and only suffer when such barriers are broken down under the exigencies of war.—The poison, which exists in all parts of the body, and is given off in the secretions and exhalations, does not spread far on the atmosphere, but may remain in a frozen or dried condition for many months, without losing its virulence. When this poison has been introduced into the system by inoculation, it remains latent for over 36 hours. At the end of the second day there is a marked elevation of the bodily temperature (2° to 3°), and the following day the mucous membranes of the mouth, nose, and vulva are suffused by a deep livid blush. At this time, or even earlier, there appear on the gums or lips whitish apthous-like elevations, formed of epithelium, which are granular or even approach the characters of pus cells in their deeper layers. On the fourth day there is dulness, appetite and rumination are impaired, and the secretions generally are lessened. On the fifth day illness is recognized by any one, in the great depression, half-closed watery eyes, retracted ears, the dry, hard, and scanty dung coated with mucus, the want of appetite, irregular breathing, and small, weak, and often accelerated pulse. Next day all the symptoms are exaggerated; the bowels are relaxed and dysenteric, the fæces passed with much straining, and the everted gut of a deep red; the back is arched, the abdomen tense and tender, the mouth covered with raw sores from the separation of the white crusts, the muzzle dry, cracked, and raw, the pulse weak and rapid, and the breathing checked with a clucking

sound and a concussion of the whole body at the commencement of expiration. This check to expiration causes emphysema of the lungs, and later of the walls of the chest, where it appears in puffy irregular swellings crackling under pressure. These symptoms are steadily aggravated, emaciation becomes extreme, weakness compels the animal to lie down constantly, the fetid stools pass involuntarily, and the temperature rapidly falls as a precursor of death, which usually happens on the seventh or eighth day. In many mild cases an eruption appears on the skin, consisting of modified epidermic cells. Buffaloes suffer from this affection, and to a less extent sheep, goats, deer, the yak, the aurochs, and even the peccary. The pathological lesions consist largely in stagnation of blood in the capillaries of the various mucous membranes, which, often in the interpulmonary air passages, but above all in the third and fourth stomachs, the small intestines, and the rectum, assume a dark claret color, and are covered besides with black spots of extravasation that may terminate in sloughing and even perforation. The mucous membranes of the urinary and generative organs are often similarly congested and ecchymosed. The blood and diseased textures contain an excess of granules in an active state of vitality, which are believed to be connected with the increase of the poison. Treatment of this disease is inadmissible. The extinction of the poison by the slaughter of the diseased animals, as advised by Lancisi in 1713 and first practised in England in 1714, has been proved by the experience of a century and a half to be the one satisfactory and economical mode of contending with it. Wherever the disease has been treated, as it was generally in former times, and in Egypt, England, and Holland more recently, the losses have been enormous; whereas in countries where the infected were promptly slaughtered, and all that had been in contact with them thoroughly disinfected, it has been invariably extinguished at a trifling cost.—2. *Aphthous Fever* (Gr. *ἀφθα*, from *ἀπτεν*, to set on fire), *Vesicular Murrain*, *Eczema Epizootica*, or *Foot and Mouth Disease*, is a contagious fever of ruminants and omnivora, communicable to other mammals and to fowls by inoculation or the use of the warm milk. It is characterized by the eruption of blisters on the mouth, udder, teats, and feet. It is first distinctly described as prevailing among Silesian cattle in 1686, and has since spread on the occasion of every great European war. England was long protected by its insular position, but imported the disease in 1839, and has steadily maintained it by her continental cattle trade. In 1870 it was carried from England to Canada, and later to Buenos Ayres. From Canada it spread to New York, Connecticut, and Massachusetts; but in the absence of large markets for store cattle, it died out here under moderate restrictions as to movement of stock. Some cases reappeared

in Rensselaer county, N. Y., in the spring of 1871, and in Dutchess county in January, 1872, doubtless from virus preserved in the buildings. It is only known as propagated by contagion, and the absence of spontaneous development in England and America is demonstrated by their immunity for centuries, until the disease was conveyed in imported cattle, by its prompt disappearance from our states when the propagation of the poison was interfered with, and by the continued exemption of some exclusively breeding and secluded districts even in England.—Almost all ruminants and swine are susceptible, but as the poison does not spread through the atmosphere, but mainly or alone on solid bodies, it is easily controlled. After an incubation of about a day, the patient appears chilly, stiff, rough-coated, with warm tender mouth, teats, and feet, and an elevation of bodily heat by 2° F. The second or third day blisters appear on the mouth, teats, and feet; the patient slavers, smacks her lips, stretches the legs out backward and shakes the feet, and flinches on milking. Soon the blisters break, leaving raw sores, which speedily heal up in the mouth, but are often maintained and extended by milking or by filth in the case of the teats and feet. Thus it is that the udder often inflames, suppurates, or sloughs, the womb sympathizes, causing abortion, or the cow becomes an inveterate kicker, or sheds her hoofs and contracts periostitis, caries, or necrosis of the bones of the foot. If however the parts are kept clean, recovery is usually complete in 8 to 16 days. Sheep and swine suffer most seriously in the feet. Other animals have blisters in the mouth, and near the hoofs, nails, or claws. Infants and other sucking animals sometimes contract fatal inflammation of the stomach and bowels. Though rarely fatal, this disease causes great losses by drying up the milk, or rendering it unfit for consumption, by disease of the udder and feet, by abortion, and other complications. It demands little treatment beyond cool soft food and cleanliness, yet advantage may be derived from a laxative when the bowels are costive, and astringent cooling lotions to the affected parts. The feet may require poulticing when much inflamed, or strong caustics when ulcerated. But, like other contagious diseases, this is best prevented by a careful professional supervision over importation, and by the complete seclusion and disinfection of diseased stock, and of all places and objects with which they have been in contact.—3. *Lung Fever*, *Pulmonary Murrain*, *Epizootic or Contagious Pleuro-pneumonia*, *Lung Plague*, &c., is a contagious fever of cattle, characterized by extensive exudations into the respiratory organs, and the phenomena of a low typhous inflammation of the lungs, pleura, and bronchia. This disease has usually spread in company with rinderpest and aphthous fever, but attracted less attention because of its long incubation, its insidious onset, and slow progress, which allowed

the public mind to be preoccupied with its more prompt and fatal congeners. Pulmonary epizootics are mentioned by Tacitus and Columella, and in 1693 Valentin described one which, being confined to cattle, was probably that of our own day. Since then it has usually spread in the track of armies and co-existed with the rinderpest. Though existing continuously in the greater part of western Europe during the whole of the present century, yet it has respected certain countries for a length of time or entirely. Thus England was protected by the narrow strait of Dover till 1889, when the disease was introduced by the same series of importations which carried aphthous fever. Denmark imported it repeatedly from England and Holland, but as often stamped it out by the destruction of the infected animals and a thorough attendant disinfection, and kept clear until the recent war with Germany. In 1860 it was imported from Scotland into Norway, but was at once extinguished by a close quarantine and careful disinfection. In 1858 it reached Oldenburg from Scotland, but was immediately annihilated by the destruction of the infected stock. Switzerland, long slandered as the native home of the plague, has cleared her farms, and now keeps them sound by inexorable slaughter. Mecklenburg has met with an equal success. In 1858 the disease reached Australia by an imported English cow, and was allowed to spread on the open plains until many of them were almost depopulated. In 1843 and 1850 it was brought to Brooklyn, N. Y., and in 1847 to New Jersey, by English cattle, and finally in 1859 into Massachusetts by Dutch cattle. The New Jersey outbreak was extinguished by the destruction of all the cattle on the farm. In Massachusetts a government commission was appointed with power to isolate exposed herds under strict supervision and to kill all diseased animals, remunerating the owners out of state funds; and they finally extinguished the disease after six years' effort and the slaughter of 1,164 cattle, besides those which died of the plague. In New York no sufficient effort was made, and the plague has since been known in the city as the swill-milk disease, and has spread in Kings and Queens counties, into New Jersey, Pennsylvania, Delaware, Maryland, the District of Columbia, and Virginia. Its progress is greatly retarded by the absence of any cattle traffic westward; but should it ever reach the great stock-raising regions of the west, it can scarcely fail to rapidly overrun the entire country.—The disease is undoubtedly propagated by contagion alone in western Europe and America. The poison, which pervades the entire body, is concentrated in the pulmonary exudation, and being exhaled in the breath spreads much further on the atmosphere than those of rinderpest and aphthous fever. It is conveyed long distances in the clothes of human beings, and hence butchers and jobbers are continually

spreading the disease in infected countries. Markets, cars, boats, loading banks, roads, pastures, yards, buildings, clothing, utensils, fodder, &c., are also fruitful means of its diffusion. The bovine race are alone susceptible. After an incubation of four to six weeks, the temperature rises to 103° or 104° F., and an infrequent short dry cough appears, which increases in frequency, depth, and hoarseness. Soon a staring coat, stiff gait, cold horns and legs, tender spine, intercostals, and breast bone, accelerated pulse and breathing, partially suppressed secretions, impaired appetite and rumination, and occasional dryness of the muzzle, mark further progress. The physical signs of effusion into the lungs and pleuræ are present from the first, and the progress of the disease, as well as of recovery, may be followed from day to day by auscultation and percussion. At first the patient may lie on the side most affected, but as the disease advances he stands obstinately with legs apart, nose protruded, and each expiration accompanied by a deep groan. The nose discharges a mucopurulent fluid, with solid masses of mucus and even blood, and a fetid watery diarrhoea sets in and rapidly wears out the animal. Emaciation becomes extreme, and death ensues in four to six weeks, if the patient has escaped the earlier risks of suffocation. The mortality is usually from 50 to 60 per cent. in a newly invaded locality. The lesions are mainly confined to the chest. The lungs are infiltrated with serosity, or later are firmly hepatized, and show the yellow lines or marbling common to all bovine pneumonia; the pleuræ are more or less filled with serum and covered by false membranes, the bronchia congested and covered with a mucopurulent discharge; softening, abscess, gangrene, &c., are not uncommon, and in the worst cases the exudations are often blood-stained. This disease is more amenable to treatment than rinderpest, but, unless where a land is already infected throughout, it is rarely advisable to treat it. Treatment consists in such measures as will moderate the fever, sustain the depressed vital functions, favor the elimination of the poison, and check its reproduction. Laxatives with cooling diuretics and arterial sedatives are often serviceable, especially in the early stages, while in the very prostrate states diffusible stimulants may be freely used. Counter-irritants may be applied to the affected parts of the chest whenever there is evidence of active inflammation, while disinfectants (carbolic acid, bisulphate of soda, and the sulpho-carbates) may be given by the mouth as well as employed to disinfect the building and discharges. The hydropathic treatment by thorough wet-sheet packing has been employed successfully, being repeated as often as the fever rises anew. But prevention is the most economical course, and when few animals in a country are infected this is best secured by their prompt destruction, followed by a thor-

ough disinfection. If a country is generally infected, sound cattle may be protected by the free use of sulphate of iron, or sulpho-carbates, by seclusion, treatment, and thorough disinfection of infected herds; or still better, by inoculation, the animals operated on being shut up in secluded and disinfected stables and treated in every respect like diseased stock. The inoculation is made on the tip of the tail with lymph from a recently infiltrated lung and a mild case of the disease. Store markets should be closed and no stock moved except under a written official warrant, and only from herds in which no disease has existed for over two months (better one year), and where disinfection has been thorough. A special supervision should be kept up at all landing ports, a clean bill of health demanded, and a sufficient quarantine enjoined, since the long incubation of this fever affords every facility for its introduction unobserved.—4. *Malignant Anthrax, Malignant Carbuncle, Carbuncular Fever, Bloody Murrain, Black Murrain, Hematosepsis, Typhæmia, Pelæmia, Blood-striking* (Ger. *Brand*, Fr. *charbon*), &c. These names are applied to a class of specific contagious diseases, enzoötic, but sometimes epizöotic, originating in herbivora, swine, and birds, and communicable to other animals, including man. It is characterized by profound changes in the chemical and vital properties of the blood, disintegration of its globules, impaired or suspended hæmatisis, and exudations and extravasations in the most varied parts, with a tendency to gangrene. In the earlier ages this class of diseases was very prevalent and disastrous, often extending like a plague; and though improved cultivation has greatly limited their ravages, they are still far too frequent and deadly. Fleming quotes from Irish records a notice of an epidemic and epizöotic in 2048 B. C., supposed to have been of this nature. The murrain in Egypt spoken of in connection with the exodus, which attacked all domestic animals (Ex. ix.), and the plague of boils and blains upon man and beast, are referable to different forms of these affections. The decimation of the Grecian army and their beasts at the siege of Troy (*Iliad*, lib. i.), and the combined epidemics and epizöotics in the Roman territories mentioned by Plutarch, Livy, and Virgil, point in the same direction. The records of the middle ages abound in accounts of pestilences on man and beast, many of them unquestionably of this kind. More recently we find the outbreak in Santo Domingo in which, from eating the dead and dying beasts, 15,000 people perished from malignant pustule in six weeks; also the yearly devastations in the Russian provinces, where besides the live stock as many as a fourth of the human population are cut off in the worst anthrax years. In the United States, epidemics occurred near Philadelphia in 1834-'6, in Louisiana in 1837-'9, and in northern New York ("malignant erysipelas"), after a "fatal epizöotic of slavers"

(*glossanthrax*) among horses, in 1825. The records of the bureau of agriculture show its prevalence in the malarious regions of the south, and isolated outbreaks and even human victims are still quite common in the northern states.—Contagion is probably the sole occasion of this affection in man, and a common cause in the lower animals also. In bad cases all parts of the body are poisonous, and the virus may be dried up and kept for an indefinite period without losing its potency; it survives a temperature of 145° F., so that cooked meat is often fatal; and its simple contact with unbroken skin has sufficed to convey the disease. Spherical and staff-like bacteria, always found in the blood and morbid fluids in fatal cases, have been fixed upon as the cause of the malady; but it remains to be proved that they are more than the effect. That insects serve to propagate it is probable, since nearly all cases in man commence on the face, hands, or other exposed part of the body. It prevails above all on marshy soils when drying, in basins with no drainage, on rich river bottoms and deltas, on stiff clays, hard pan, and other impervious subsoils, in rich valleys sheltered from winds by surrounding hills whose rocky sides radiate the heat and hasten evaporation, and even on over-manured soils, saturated with organic matter and rich in nitrates, though the drainage may be moderately good. Yet many marshes prolific of fatal malarious fevers in man are not remarkable for causing malignant anthrax. They seem to be the best fields for the permanent preservation of the poison, but are perhaps not always capable of developing it *de novo*. Plethora, youth, alternations of heat and cold, starvation, overwork, or anything indeed which lowers the vitality or loads the blood with effete organic products, lays the system open to receive the poison.—These diseases are primarily divisible into two great classes: 1, those in which the changes are confined to the blood and internal organs, especially the spleen; and 2, those which, in addition to the blood changes, present local swellings from blood extravasations and sero-albuminous exudations. Of the first class a certain proportion die after a few minutes' illness. This, the apoplectic form, occurs in swine, horses, sheep, and cattle, in about the order named. From apparent health the victim suddenly falls, struggles, perhaps expels blood by some natural opening (nose, anus), and dies. In these there is little change even in the blood. More protracted are splenic apoplexy of horse and ox, blood-striking, braxy or *sang-de-rate* of sheep, and the carbuncular fever of swine and fowls. In these there are profound nervous prostration, pendent head, excited pulse and breathing, sometimes abdominal pain, spots of blood-staining on the visible mucous membranes, or a deep yellow or brownish hue of these parts, and the passage of the elements of blood by some of the natural openings (nose, anus, urinary or-

gans). The temperature, rarely elevated, may be even lowered. Death ensues in from six hours to several days. The blood globules are largely disintegrated, the fibrine replaced by a comparatively incoagulable less oxidized element; if a clot forms, it fails to contract and squeeze out the serum; the blood reddens but little on exposure, its liquid part is stained by dissolved hæmatine, and it contains spherical and elongated bacteria. *Rigor mortis* is rare, decomposition setting in at once with intolerable fœtor. The spleen is enlarged, sometimes ruptured, and other internal organs are often the seats of extravasation or exudation.—The localized forms of the disease are as varied as the seat and extent of the swellings. All such swellings however have characters in common. They appear suddenly, after some general fever and lassitude, and increase rapidly. The skin covering them tends to gangrene, and dries and hardens in part or in whole, becoming cold, and crackling on pressure from the ex-trication of gas beneath. Blisters with red or purple contents may form, or a yellow or purple liquid may ooze from the surface. Extensive sloughing often succeeds. Active inflammation and suppuration are favorable signs. The smaller swellings will sometimes shift from place to place. These external forms of the affection are less fatal than the internal. Among them may be mentioned many cases of so-called *purpura hæmorrhagica* in the horse, in which the head, limbs, and other parts are engorged; the *glossanthrax* or black tongue; the black-quarter of cattle, in which extravasation takes place in one limb or a part of the trunk; the carbuncular erysipelas of sheep and swine; the anthrax of the mouth and carbuncular sore throat of hogs; the boil plague of eastern Europe and Asia; and finally the malignant pustule of man. (See PUSTULE.) The treatment in the local forms of the disease is to destroy the diseased structures with caustic before the general system has been poisoned. For more extended swellings, attended by constitutional disturbance, antiseptics may be applied locally or, better, injected into the enlargements. Carbolic, sulphuric, and chromic acids and iodine may be mentioned, the last having destroyed the virulence of anthrax fluids when dissolved in 12,000 times its weight of water. When sores have formed, the extravasations and exudations may be cauterized throughout, and the sound tissues beneath stimulated to a healthy action. But no sores should be made, save with the fine nozzle of the injecting syringe, where they do not already exist. In both internal and external forms of the affection, the system must be supported by tonics and stimulants; gentle laxatives and diuretics may be used to eliminate waste and pernicious matters from the blood, and antiseptics administered to check the proliferation of the poison as far as possible. Carbolic acid, chromic acid, the mineral acids, and iodine are especially to be recommended. By way of prevention noth-

ing succeeds better than thorough drainage, removal of animals from dangerous enclosed valleys, rich river bottoms, &c., during the hot and dry season, keeping stock indoors until the dews have disappeared in the mornings, good steady dieting, the avoidance of suddenly induced plethora, the maintenance of a healthy action of bowels, kidneys, and skin, and a general attention to sound hygienic principles.

MURRAY. I. A N. W. county of Georgia, bordering on Tennessee, bounded W. by the Conna-sauga river and drained by its branches; area, 320 sq. m.; pop. in 1870, 6,500, of whom 757 were colored. The surface is elevated, and the soil generally fertile. Gold, silver, lead, and zinc are found. The chief productions in 1870 were 47,269 bushels of wheat, 151,286 of Indian corn, 11,123 of oats, 5,810 lbs. of wool, 40,851 of butter, 7,698 of tobacco, 288 bales of cotton, and 10,050 gallons of sorghum molasses. There were 659 horses, 1,067 milch cows, 1,722 other cattle, 3,025 sheep, and 5,454 swine. Capital, Spring Place. II. A S. W. county of Minnesota, drained by the Des Moines and Rock rivers and other streams; area, 720 sq. m.; pop. in 1870, 209. The surface consists of rolling prairies.

MURRAY, or *Goolwa*, a river of Australia, which rises in the Warragong mountains, in lat. $36^{\circ} 20'$ S., lon. $148^{\circ} 15'$ E. Its course is very tortuous, the curvatures being short, abrupt, and almost incessant. After descending from the highlands, it flows nearly westward to lon. $144^{\circ} 45'$ E., then takes a N. W. direction to Mt. Lookout, where again turning it proceeds to Elbow, in lat. 34° S., lon. $139^{\circ} 46'$ E., and there bending suddenly runs S. S. W. to Lake Victoria, into which it falls at Wellington in lat. $35^{\circ} 30'$ S. This river and its tributaries drain an area of about 500,000 sq. m. Its length is about 1,000 m., and its average breadth from 100 to 150 yards. It overflows its banks periodically, and sometimes rises 30 or 40 ft. above its ordinary level. During this season it is navigable to within 90 m. of its source, and then steamers and barges ply regularly between Wellington, Albury, and the intermediate towns. Its principal affluents are the Goulburn, Campaspe, Murrumbidgee (with the Lachlan), and Darling. Lake Alexandrina, Victoria, or Kayinga, which connects it with the sea, is about 30 m. long and 15 m. broad, but in general very shallow. The entrance to it from the sea not being navigable, a tramway has been constructed between Goolwa and Port Elliot, which is worked in connection with the river steamers.

MURRAY, Alexander, an American naval officer, born at Chestertown, Md., in 1755, died in Philadelphia, Oct. 6, 1821. In 1776 he was appointed a lieutenant in the continental navy, but there being no employment for him afloat, he served through the campaigns of 1776-'7 as lieutenant and captain in the first Maryland regiment, participating in the battles of Flatbush and White Plains. At the close of the cam-

paign of 1777 he was appointed to the command of a letter of marque, in which he was captured by a British squadron and carried into New York. After his exchange he served as lieutenant in the Trumbull, in the action with the Iris and Gen. Monk off the mouth of the Delaware. In 1798 he was made captain, and served in the West Indies, in command of the Montezuma, and afterward of the Constellation. In 1802 he commanded the Constellation in the Mediterranean; and an attack which he made upon a flotilla of 17 gunboats was the first affair of the war with Tripoli. At his death he was in command of the navy yard at Philadelphia, and was senior officer of the navy.

MURRAY, Alexander, a Scottish philologist, born at Dunkitterick, Kirkcudbrightshire, Oct. 22, 1775, died in Edinburgh, April 15, 1813. He was the son of a shepherd, learned French, Latin, Greek, Hebrew, Arabic, Welsh, and Anglo-Saxon, and in 1794 entered the university of Edinburgh. In 1806 he was assistant pastor, and in 1808 became pastor of Urr in Kirkcudbrightshire. In 1811 he translated a letter in Geez or old Ethiopic, addressed to the king by the sovereign of Tigré in Abyssinia; and in the following year he was elected to the chair of oriental languages in the university of Edinburgh. His most important works are "Outlines of Oriental Philosophy" (Edinburgh, 1812), and "History of the European Languages, or Researches into the Affinities of the Teutonic, Greek, Celtic, Slavonic, and Indian Nations" (1813). He also edited Bruce's "Travels," and contributed some philological papers to the "Edinburgh Review."

MURRAY, or Moray, James Stuart, earl of, regent of Scotland, born about 1533, killed at Linlithgow, Jan. 23, 1570. He was an illegitimate son of James V. and Lady Margaret, daughter of John, fourth Lord Erskine, and when a little child was appointed by his father prior of St. Andrews. He afterward acquired the priory of Pittenweem, and that of Mácon in France, *in commendam*, with a dispensation to hold three benefices. In 1548, on the invasion of Scotland by Lords Grey de Wilton and Clinton, the one by land, the other by sea, the young prior commanded a small band and repelled a descent made by the latter upon St. Monan on the coast of Fife, driving back the invaders to their ships. In the same year he accompanied his sister Mary to the court of France. In 1558 he was one of the commissioners from Scotland to witness the ceremony of marriage between Mary and the dauphin of France, afterward Francis II. In the contest between the queen regent and the lords of the congregation, he sided alternately with both parties, but finally joined the latter; and when in 1559 the congregation resolved to take the government into their own hands, he was one of the council appointed for civil affairs. After the death of the queen regent in June, 1560, he became one of the lords of the articles, and on the death of Francis II. was commissioned

to go to France and invite Mary to Scotland. On her return he became her confidant, adviser, and prime minister, protected her in the exercise of her religion, obtained from her a proclamation favorable to the reformers, cleared the border of freebooters, and ruled the country with judgment and ability. He was rewarded with the title of earl of Mar, and married soon after Agnes Keith, daughter of the earl marischal, on which occasion Mary gave a series of splendid entertainments. Lord Erskine claiming the earldom of Mar as his peculiar right, Lord James resigned it and received instead the earldom of Murray, and shortly after defeated at Corrichie the earl of Huntly, an unsuccessful competitor for power and popularity. Although governing Scotland judiciously and with undisputed authority, he was too lukewarm a Protestant for the extreme reformers, who lamented the protection he afforded to the queen in the use of the mass, and particularly his defence of her and her ladies in what Knox called "the superfluities of their clothes." Between Knox and Murray a coolness sprung up in consequence, which continued a year and a half; but they were brought together again by their mutual opposition to the queen's marriage with Darnley. Murray had endeavored to prevent it, and finally resorted to arms; but being pursued by his sister at the head of a superior force, he was compelled to fly to England. On the murder of Rizzio, however, he was recalled, and apparently reconciled to the queen. It is not certain whether or not he was accessory to the murder of Darnley. He left Edinburgh the day before, and was also absent from Scotland during the trial of Bothwell and his subsequent marriage with Mary. After the dethronement of the queen and her confinement in Lochleven castle, Murray was appointed regent of Scotland, Aug. 22, 1567. In this situation he acted with vigor and discretion, and kept the country in a state of tranquillity. On the escape of the queen he refused to resign his power, defeated her and her adherents at Langside, March 13, 1568, and followed up the victory by destroying the strongholds of her friends, and more firmly establishing the government. When Mary was tried at York for complicity in the murder of Darnley, Murray bore the most unqualified testimony against her. In passing through the streets of Linlithgow, he was shot through the body by a bullet fired from a window by James Hamilton of Bothwellhaugh, and died the same night. Bothwellhaugh's conduct has generally been ascribed to revenge for a personal injury, but there is reason for believing that he acted as the executioner of a doom pronounced on Murray by his enemies in secret conclave.

MURRAY, John, an American clergyman, born in Alton, Hampshire, England, Dec. 10, 1741, died in Boston, Mass., Sept. 3, 1815. Under the influence of Wesley and Whitefield he became a convert to Methodism, and an occasion-

al preacher in Wesley's connection in Cork, Ireland, whither his parents had removed. About 1760 he returned to England, and a few years later adopted the doctrines of Universalism promulgated by James Kelly, for which he was excommunicated at Whitefield's tabernacle in London. In 1770 he emigrated to the United States. New York and New Jersey were the first scenes of his labors, and subsequently he preached in Newport, R. I., Boston, Portsmouth, N. H., and other places in New England, in some of which his peculiar doctrines subjected him to opposition, and occasionally to open violence. In 1774 he resided in Gloucester, Mass., and upon suspicion that he was an emissary of the British government in disguise, he was ordered to depart; but through the exertions of his friends he was enabled to remain and preach. In the spring of 1775 he was chaplain of the three regiments of the Rhode Island line encamped before Boston, with several of whose officers, including Greene and Varnum, he was on terms of intimacy. The rest of the chaplains united in petitioning Washington to remove Murray from his office, but without effect. His connection with the army was soon after terminated by illness, and he returned to Gloucester, where he was established over a society of Universalists. In 1783 he became plaintiff in a successful action brought to recover property belonging to persons of his denomination, which had been appropriated to the expenses of the original parish of Gloucester, on the ground that the Universalists were not a society legally authorized. He participated in the proceedings of the first Universalist convention at Oxford, Mass., in 1785, and for a number of years he was a delegate to the general convention of the Universalists. In 1788 he made a brief visit to England, and in 1793 was installed over a society in Boston, where he passed the remainder of his life. In 1809 he was paralyzed. He is considered the father of Universalism in America, although his doctrines differed essentially from those now recognized by Universalists. He published three volumes of letters and sketches of sermons, and wrote an autobiography (8th ed., Boston, 1860).

MURRAY, John, a Scottish physician, born in Edinburgh in 1778, died there, June 22, 1820. He began his career as an apothecary in his native city, and subsequently became eminent as a lecturer on natural philosophy, chemistry, materia medica, and pharmacy. In geology he was a zealous Neptunian, and in reply to Playfair's "Illustrations of the Huttonian Theory of the Earth" (1802), published his "Comparative View of the Huttonian and Neptunian Theories." The most important of his other works are "System of Chemistry," "Elements of Chemistry," and "System of Materia Medica and Pharmacy."

MURRAY, John, an English publisher, born in London, Nov. 27, 1778, died June 27, 1843. He was of Scottish descent, and his father,

whose name was MacMurray, established himself in 1768 as a bookseller in Fleet street, London. After a good education acquired at a number of schools, at one of which he lost the sight of an eye by an accident, he was left in his 15th year by his father's death to conduct the business, in which he was assisted by Mr. Highley the shopman, whom he subsequently took into partnership. In 1803 he terminated this connection, and, entering a wider sphere of business, was thenceforth known as one of the most enterprising and liberal publishers of London. By coming forward to the assistance of a number of young men who had become involved in some pecuniary loss in conducting a periodical called the "Miniature," he secured several influential friends, among others Mr. Canning. With the latter he matured in 1807 a project for the establishment of the "Quarterly Review" as a means of counteracting the influence of the whig "Edinburgh Review;" and securing the coöperation of George Ellis, the Hebers, Barrow, Gifford, and others, he commenced in 1809 the publication of the new periodical, which under the editorial supervision of Gifford soon attained a circulation of 12,000 copies. In 1810 Mr. Murray made the acquaintance of Lord Byron, to whom he paid £600 for the first two cantos of "Childe Harold," and whose entire works he subsequently published. Of his generosity and consideration toward the poet many instances are given; and Byron's correspondence with him, published in Moore's "Life of Byron," affords an evidence of the friendly relations existing between them. In 1812 he removed to Albemarle street, where the business is still carried on by his son and successor, John Murray, and where a long line of literary celebrities, including Scott, Byron, Campbell, W. Spencer, Bishop Heber, the elder Disraeli, Hallam, Mme. de Staël, Crabbe, Southey, Washington Irving, and Lockhart, were wont to assemble. Of the numerous important works issued from the press of this house, it may suffice to mention the voyages and travels of Mungo Park, Belzoni, Parry, Franklin, Denham, Clapperton, and Layard; the series of the "Family Library;" the histories of Hallam, Lord Mahon, Grote, Ranke, Sir Gardner Wilkinson, and Mrs. Markham; the "Sketch Book," "Tales of a Traveller," "Life of Columbus," and other works of Washington Irving; the "Domestic Cookery," of which 300,000 copies were published; the despatches of the duke of Wellington; the dictionaries of William Smith; an elaborate series of handbooks of travel; and the works of Crabbe, Heber, Lockhart, Milman, Head, Gleig, Kugler, Lord Campbell, Leake, Borrow, Davy, Rawlinson, Mrs. Somerville, Lyell, Murchison, &c. In 1826 he was persuaded into establishing a daily journal called the "Representative," which proved a failure; but in general his good judgment and tact as a business man rendered his enterprises successful, and the publications

emanating from his house were for the most part books of merit, his imprint being one of their best recommendations. His liberality to authors was a distinguishing trait in his character, and he sometimes made heavy pecuniary sacrifices to gratify others, as in the case of the autobiography of Lord Byron, which he surrendered to Moore on the representation that the publication of it might injure the reputation of the living as well as the dead.

MURRAY, Lindley, an English grammarian, born at Swatara, Lancaster co., Pa., in 1745, died near York, England, Feb. 16, 1826. He received his primary education in Philadelphia, in the academy of the society of Friends; in 1753 he was placed for a time in school in New York, and then entered a counting house, being destined for the mercantile profession. He afterward studied law, was admitted to the bar, and his practice soon became extensive. When the revolutionary war broke out, he retired to the country on account of his health, and there remained four years. But the want of pecuniary means compelling him to return, he engaged in mercantile pursuits, and by the close of the war his fortune had become so ample that he was enabled to retire from business. Impaired health soon induced him to go to England with his family, where he purchased an estate at Holdgate, near York, and occupied himself chiefly with literary pursuits. In 1787 his first work, "The Power of Religion on the Mind," was published anonymously. His "Grammar of the English Language," first issued in 1795, and enlarged and improved in successive editions, for many years superseded all others. In 1797 he published "English Exercises," and a "Key" designed to accompany the grammar; and subsequently an "English Reader," an "Introduction to the English Reader," and an "English Spelling Book." He also published French reading books of a character similar to his English ones. His last publication was a selection from Horne's "Commentary on the Psalms," and "The Duty and Benefits of Reading the Scriptures" (1817). His autobiography, finished in 1809, was published posthumously in 1826.

MURRAY, Nicholas, an American clergyman, born in Ireland, Dec. 25, 1803, died in Elizabethtown, N. J., Feb. 4, 1861. In 1818 he came to America, and became an apprentice in the printing establishment of Harper and brothers. He was brought up a Roman Catholic, but became a Protestant, graduated at Williams college in 1826, studied theology at Princeton, and in 1829 became pastor of a Presbyterian church in Wilkesbarre, Pa. From 1834 till his death he was pastor of the first Presbyterian church at Elizabethtown, N. J. In 1849 he was elected moderator of the Presbyterian general assembly. He published "Notes, Historical and Biographical, concerning Elizabethtown, N. J." (Elizabethtown, 1844); "Letters to the Right Rev. John Hughes, Roman Catholic Bishop of New York," under the signature

of "Kirwan" (New York, 1848; enlarged ed., 1855); "Romanism at Home" (1852); "Men and Things as I saw them in Europe" (1853); "Parish and other Pencilings" (1854); "The Happy Home" (1859); and "Preachers and Preaching" (1860). "A Dying Legacy," a posthumous volume, was printed in 1861.

MURRAY, Patrick, fifth Baron Elibank, a Scottish author, born in February, 1703, died Aug. 3, 1778. In 1723 he was admitted to the Scottish bar, but entered the army the same year, and in 1740 was lieutenant colonel in the expedition to Cartagena, South America. Afterward he turned his attention to literature, and published "Thoughts on Money, Circulation, and Paper Currency" (Edinburgh, 1758); "An Inquiry into the Origin and Consequence of the Public Debts;" "Queries relating to the Proposed Plan for altering Entails in Scotland" (1765); "Letter to Lord Hailes on his Remarks on the History of Scotland" (1773); and "Considerations on the Present State of the Peerage of Scotland" (1774). In politics he was an adherent of the house of Stuart, with whom he maintained a secret correspondence.

MURRAY, or Moray, Sir Robert, one of the founders of the royal society of London, born in Scotland about the beginning of the 17th century, died in June, 1673. In his youth he entered the French service, and rose to the rank of colonel. Subsequently returning to Scotland, he became an ardent supporter of Charles I., and afterward of Charles II., the latter of whom in 1651, during his brief reign in Scotland, appointed him justice clerk and lord of session. During the protectorate his offices were taken from him, but he received them again at the restoration. He was a prominent member of a small club established in London by Boyle, Lord Brounker, and others, for the discussion of questions in natural science, or, as it was then termed, "the new philosophy," and which by Sir Robert Murray's efforts obtained in 1662 a royal charter as a regular scientific body.

MURRAY, William. See MANSFIELD.

MURRAY, William Henry Harrison, an American clergyman, born in Guilford, Conn., April 26, 1840. He graduated at Yale college in 1862, and was licensed to preach in 1863. In 1864 he became pastor of the Congregational church in Greenwich, Conn., but removed in 1866 to West Meriden, Conn. In 1868 he was settled as pastor of the Park street church in Boston. He has become distinguished both as a pulpit orator and as a lecturer, and during the winters of 1869-'70 and 1872-'3 he delivered courses of Sunday evening sermons in the music hall, Boston, which have been published under the title "Music Hall Sermons" (2 vols., Boston, 1870-'73). He has also published "Camp Life in the Adirondack Mountains" (1868); "Words Fitly Spoken" (1873), being selections from his pulpit utterances; and "The Perfect Horse" (1873), a contribution to agricultural literature. A weekly publication of his ser-

mons delivered in his church, under the title "Park Street Pulpit," was issued in Boston from the beginning of 1871 till October, 1874, when Mr. Murray resigned his pastorate.

MURVIEDRO (anc. *Saguntum*), a town of Spain, in the province and 16 m. N. by E. of the city of Valencia; pop. about 7,500. It is on the right bank of the Palancia, and was once a seaport, but the recession of the sea has left it 4 m. inland. It is a straggling town at the foot of a hill, which is crowned by a citadel, and the streets are narrow and crooked. The principal industrial establishments are flour and oil mills and four distilleries. The Goths, the Moors, and the Spaniards have freely used the rich marbles of Saguntum as materials for later structures. In 1867 a wall was built around the ruins of the theatre. The fortress was the key of Valencia, and the French under Suchet captured it in 1811, after a battle on the plain, Oct. 25, where with about 20,000 men they defeated the Spanish Gen. Blake, who attacked them with 25,000. (See *SAGUNTUM*.)

MUSEUS. I. A Greek poet, who flourished at Athens in prehistoric times. He was said by some to have been a native of Thrace and a son of Orpheus; while others represented him as the son of Eumolpus and Selene, or of Antiphemus and Helena, and the disciple of Orpheus. He was regarded as the author of various compositions, especially of such as were connected with the rites of Ceres at Eleusis, over which he was thought to have at one period presided. According to a tradition preserved by Pausanias, the Museum at Piræus received its name from Musæus having been interred there. A few specimens of his reputed works are extant; but Pausanias deemed none of the productions ascribed to him genuine except a hymn to Ceres. **II.** A Greek grammarian, supposed by most modern critics to have lived at about the beginning of the 6th century A. D. He was the author of the poem on "The Loves of Hero and Leander," discovered in the 13th century. The best editions of it are those of Passow (Leipsic, 1810) and Schäfer (1825). It was jointly translated into English by Marlowe and Chapman (1606), and there are several other English versions.

MUSÄUS, Johann Karl August, a German author, born in Jena in 1735, died in Weimar, Oct. 28, 1787. He studied theology, and was a candidate for a rural parish, but his services were declined on account of his having participated in a dance; upon which he renounced divinity, and accepted in 1763 an employment at the court of Weimar, as governor of the pages. He exchanged this office in 1770 for that of professor at the gymnasium of Weimar, which he held until his death. He wrote *Grandison der Zweite*, republished in 1781-'2 under the title of *Der Deutsche Grandison*, directed against Richardson's admirers. He also took the field against Lavater in his *Physiognomische Reisen*. His *Völksmärchen der Deutschen* (5 vols., 1782) gained a still wider popularity.

Kotzebue prepared an edition of his remains (Leipsic, 1791), with a biography of the author, whom he calls the good Musäus. Carlyle's "Specimens of German Romance" (London, 1827) contains versions of some of the tales.

MUSCARDINE, a name given by the French to a disease which for the last 20 years has proved very destructive to silkworms, and has seriously interfered with the production of silk in France and other parts of Europe. The fact is now well established that the disease is due to a minute fungus, *botrytis bassiana*, which is not confined to the silkworm, but attacks several other caterpillars. The mycelium (see *FUNGUS*) of this fungus lives in and feeds upon the intestines and other interior portions of the silkworm, finally destroying it. After its death the reproductive portion of the fungus may be seen upon the surface of the worm, giving it the appearance of having been dusted with flour; under a microscope this appears to be a forest of minute branching threads which produce an abundance of spores. Sometimes the silkworm retains sufficient vitality to spin its cocoon, and the fungus does not manifest itself externally until the caterpillar has assumed the state of pupa. It is found that the disease is communicated even if the spores fall upon the skin of the worm; indeed, the spores are so exceedingly small that they readily escape observation, and when the fungus is once introduced into an establishment they may be on the leaves upon which the worm feeds, and be thus taken into its interior, or they may be brought in contact with the worms in various ways. Absolute cleanliness and washing every portion of the room with lime water are the means of preventing its spread. Neither muscardine nor any other of the diseases of silkworms has appeared in California.

MUSCAT, or **Mascat**, the chief city of Oman, in Arabia, situated at the head of a small inlet of the Indian ocean, in lat. 23° 38' N., lon. 58° 40' E., about 240 m. S. E. of the entrance to the Persian gulf; pop. within the walls, about 30,000; of the suburbs, 5,000. The cove of Muscat, as the harbor is called, is about three fourths of a mile long and half as broad, opening toward the northwest. To the west of this inlet is the larger bay of Muttra, or Matara, capable of affording shelter to shipping when bad weather renders it difficult to enter the cove. The city stands on the S. side of the cove, in a hollow at the foot of cliffs 400 or 500 ft. high, and there is only one pass communicating with the interior. As seen from the sea, these cliffs have no trace of vegetation. Their summits and flanks are occupied by a chain of forts and towers, reached by difficult and narrow paths. These fortifications, which were built by the Portuguese at the end of the 16th century, are in a ruinous condition, and most of their guns have lost their carriages. The city walls are flanked by four fortified gates. The streets are narrow and dirty, and some of them are almost impass-

sable. Half the town is in ruins. Many of the houses are mere mat huts, and even those of the better class are seldom more than one story high. The sultan's residence is a very plain edifice. There is no police, and no constraint on the citizens, who have the largest liberty, and eat, sleep, and sometimes die in the open streets. The climate is excessively hot, and the land breeze at night is suffocating. The thermometer rarely falls below 90° in the shade. The inhabitants are composed of Arabs, Persians, Syrians, Kurds, Hindoos, Afghans, Belooches, and negroes. The prevailing language is a corrupt Hindostanee, the Arabic tongue being confined to the native Arabs. Most of the merchants live at Muttra and other towns along the coast, and bring in boats each morning the produce of the interior and of the places along the Persian gulf, even fire wood being thus imported. Muscat has an extensive transit trade with Arabia,

Persia, and India. Corn and cloth are the principal imports; the exports are dates, horses, salt fish, hides, and madder, which are sent to India; sharks' fins, to China; and asses, to Mauritius. The harbor abounds with fish, and large quantities are cured.—The district of Muscat comprises the city and its suburbs, and the city and suburbs of Muttra, which, about 4 m. W. of Muscat, is connected with it by a good road. Muttra stands in an open plain exposed to the sea breeze, and is much cooler than Muscat. It has docks for building and repairing ships, and a large part of its population of about 25,000 are fishermen, boatmen, sailors, and pilots. The sterility of the country around Muscat is only apparent. In the valleys back of the hills are woods, streams, gardens, and villages.—In the 15th century Muscat was a place of considerable importance, and was subject to Ormuz. Albuquerque took it in 1507, and it soon after became the centre



Muscat.

of the Portuguese commerce in that part of the world. In 1648 the natives expelled the Portuguese, and took possession of several places in the Persian gulf. In 1707 they obtained permission from the king of Pegu to build vessels in his territory, constructed ships armed with from 30 to 50 guns, and committed great depredations on the coasts of Malabar and the Persian gulf, and on vessels in the Indian ocean. During the latter part of the 18th century they gave up their piratical habits and engaged largely in commerce. (See OMAN.)

MUSCAT or Muscatel Wine. See FRANCE, WINES OF, vol. vii., p. 411, and GERMANY, WINES OF, vol. vii., p. 775.

MUSCATINE, a S. E. county of Iowa, bordering on Illinois, from which it is separated by the Mississippi, and intersected by Red Cedar river; area, 440 sq. m.; pop. in 1870, 21,688. It has a diversified surface and fertile soil, and contains extensive beds of coal and quarries of freestone and limestone. It is traversed by

the Chicago, Rock Island, and Pacific railroad. The chief productions in 1870 were 333,147 bushels of wheat, 36,726 of rye, 1,208,640 of Indian corn, 320,256 of oats, 96,049 of barley, 147,005 of potatoes, 28,090 lbs. of wool, 380,382 of butter, and 29,841 tons of hay. There were 9,238 horses, 7,101 milch cows, 12,656 other cattle, 7,173 sheep, and 24,504 swine; 5 manufactories of boots and shoes, 13 of carriages and wagons, 9 of clothing, 4 of machinery, 11 of saddlery and harness, 10 of tin, copper, and sheet-iron ware, 6 breweries, 4 flour mills, 2 planing mills, and 3 saw mills. Capital, Muscatine.

MUSCATINE, a city and the capital of Muscatine co., Iowa, on the W. bank of the Mississippi, at the apex of the great bend, and on the Muscatine division of the Burlington, Cedar Rapids, and Minnesota railroad, and the southwestern branch of the Chicago, Rock Island, and Pacific line, 130 m. E. of Des Moines; pop. in 1850, 2,540; in 1860, 5,324; in 1870,

6,718; in 1873, 7,940. It is built on a rocky bluff, and is the shipping point of an extensive and fertile country. Its lumber business is large, employing 500 hands. Four large saw mills in 1872 produced 30,100,000 ft. of lumber, 20,950,000 shingles, and 8,700,000 laths. The entire quantity handled at this point during the same year embraced 63,668,000 ft. of lumber, 27,891,000 shingles, and 15,049,000 laths. There are two large pork-packing establishments, three extensive flour mills, gas works, and three banking houses. The city

has good public schools, a Catholic school, two daily, a semi-weekly, and three weekly newspapers, a monthly periodical, and 14 churches. Muscatine was first settled in 1836, and was incorporated as a city in 1853.

MUSCLE (Lat. *musculus*), the fibrous contractile tissue forming the flesh of man and animals, by which locomotion and the various functions of life requiring voluntary or involuntary movements are performed. Whether elongated or enclosing a cavity, this tissue is arranged in the form of fibres, usually in bun-



FIG. 1.—Muscles and Tendons of the Arm and Hand.

dles connected by areolar tissue, surrounded by a vascular network, and supplied with nervous filaments. Muscles are so arranged as to produce great velocity, extent of motion, and strength, without injuring the beauty of proportions, by the obliquity of their fibres to the tendons and of the last to the bones on which they act, and by the proximity of their points of insertion to the axis of motion of the joints. Muscles are attached to bone by means of tendons, rounded or flattened fibrous cords, white and shining, inelastic, and very resisting; aponeuroses or fasciæ are firm, shining fibrous membranes, enveloping the muscles, giving attachments to their fibres, and often fixed to bones like the tendons. Muscles occupy the whole distance between the skin and bones, and take an elongated, broad, or thin form, according to the necessities of the several parts of the body; their strength is in proportion to their length and thickness, and may be rapidly exhausted by continuous exertion. Muscles are called voluntary or involuntary, according as they are or are not under the control of the will; the division is not strictly accurate, as all of the former at times contract independently of the will, and some of the latter are to a certain extent under the influence of volition. The former are generally solid, as in the muscles of the trunk and limbs, and the latter hollow, as in the heart or the muscular layers surrounding cavities and canals. The voluntary and involuntary muscles are also distinguished by their structure; the former consisting of striped, the latter of unstriped fibres. The fibres of voluntary muscles are generally cylindrical, though more or less prismatic or many-sided, being somewhat flattened against each other. They vary in length in different muscles, and in the human subject average $\frac{1}{4}$ to $\frac{1}{2}$ of an inch in diameter. Their color in man and the higher animals is ruddy, and they are elegantly marked by transverse or circular striations, giving them a very characteris-

tic appearance, which has led to their being distinguished by the name of striped fibres. They consist of a cylindrical or prismatic mass of contractile substance marked with the above

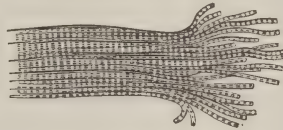


FIG. 2.—Striped Muscular Fibre, crushed at one end and breaking up into fibrillæ.

mentioned striations throughout its entire thickness, and containing also minute elongated or oval bodies termed nuclei. Each fibre is invested by a delicate, transparent, structureless and colorless membrane, the *sarcolemma*, which supports the contractile material and limits its lateral expansion. The fibres are

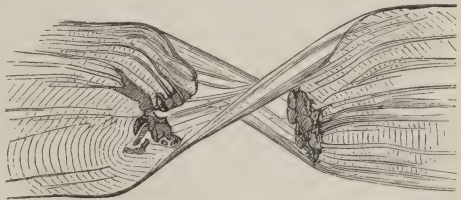


FIG. 3.—Striped Muscular Fibre, highly magnified, torn across, and showing the Sarcolemma.

arranged side by side, parallel with each other, and united in small groups or bundles of 100 to 200 each. These bundles are again united into larger secondary bundles, connected with each other by areolar tissue, and so on; the entire muscle being invested with an external fibrous expansion of condensed areolar tissue, and abundantly supplied with blood vessels and nerves. The unstriped or involuntary muscular fibres are soft, pale, flattened

bands, apparently homogeneous or finely granular, about $\frac{1}{8000}$ of an inch in diameter, with an elongated nucleus in the central part of each one. The fibres are arranged in paral-

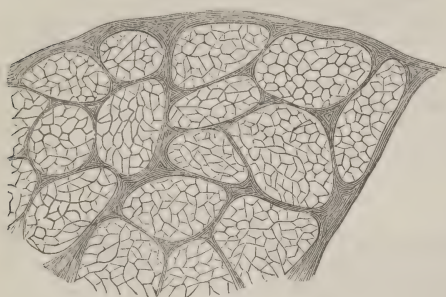


FIG. 4.—Transverse Section of a Voluntary Muscle, showing the bundles of Muscular Fibres and intervening layers of Areolar Tissue, and the external Fibrous Expansion.

lel layers, their pointed extremities interlocking with each other, so as to form membranous expansions surrounding the cavities of the internal organs. Thus the œsophagus, the

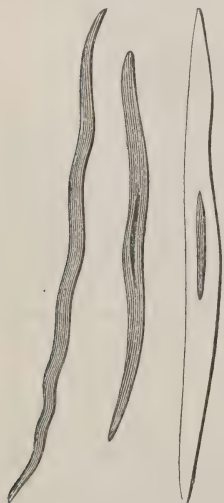


FIG. 5.—Unstriped Muscular Fibres, highly magnified, from the walls of the Renal Vein.

stomach, the intestines, the bladder and urinary passages, the uterus and Fallopian tubes, the excretory ducts of the glandular organs, and the arteries and veins, all have their muscular coat, composed of unstriped fibres, and liable to contraction and relaxation independently of the will. An exception to the rule that involuntary muscular organs are composed of unstriped fibres is found in the heart and in the great veins immediately contiguous to it. Here the muscular fibres belong to the striped variety, but they are smaller than those of voluntary muscles, their striations are less distinct, and they also present the peculiarity of branching and inosculating with each other, which is not seen in other striated muscular fibres. In all probability the difference in structure between the two kinds of fibres, strictly speaking, has reference to their mode of contraction, rather than to its voluntary or involuntary character. The contraction of the striped muscular fibres is prompt, vigorous, and rapidly followed by relaxation, as in the voluntary muscles and the heart; that of the unstriped fibres is generally sluggish, gradual, and continued, as in the peristaltic action

of the alimentary canal. Striped fibres have been found in all vertebrates and in articulates; as we descend the animal scale the movements become more and more automatic, until complex muscular action gives place to simple ciliary vibration.—The contractility of muscle depends on an inherent property, independent of, though capable of modification by, nervous influence. The stimuli which induce contraction are volition, emotion, impressions conveyed to the nervous centres and involuntarily reflected thence, and various physical and chemical agents applied to any portion of the course of a motor nerve or to the muscular fibres. A muscle in action becomes shorter and thicker, changing its relative proportions without any actual change in bulk. After death muscles become fixed and rigid, a condition constituting the *rigor mortis*. In the active contractions which characterize muscles on the application of stimulus, force is exerted against some opposing power; this is attended with exhaustion or fatigue, and requires intervals of rest. Sustained contraction consists of an infinite number of partial momentary contractions acting in succession. There are altogether in the human body 527 distinct muscles, of which 261 are in pairs, and 5 single on the median line; of these there are in the head and face 83, the *orbicularis oris* being single; in the neck 49, the arytenoid of the larynx being single; in the thorax 78, the *triangularis sterni* and the diaphragm being single; in the abdomen 33, the *sphincter ani* being single; in the back 78; in the upper extremities 98, and in the lower 108. Yet, with all this complex apparatus, everything is in perfect order and harmony. Matteucci and Du Bois-Reymond have investigated the electric currents of muscles. The combination of the muscular movements is in most cases so far independent of the will, that we are apt to lose sight of their perfection; but let paralysis affect one side of the body or contraction draw up a muscle, and the fact becomes at once evident, as may be seen every day in palsy of one side of the face, or strabismus with the turning in or out of the eye. The simple process of walking, performed it may be unconsciously, with its nice adjustments executed by the automatic guidance of the senses rather than by any act of the will, is what the most ingenious mechanician can never effect in an automaton, from the impossibility of harmonizing the many acts which constitute walking.—The energy and rapidity of muscular contraction is more remarkable in the lower animals than in man. The muscular power of insects is seen in the rapid flight of the dragon fly, the leap of the flea and the cricket, the fixed attitudes of some larvæ, and the strength of beetles. It is very great in the flight of birds, though their whole structure is organized for aerial motion; the power of the wings is three times as great as that of the legs in ordinary birds, and their absolute power in proportion to the weight of the body is as 10,000 to 1; in small birds the

movements of the wings are so rapid that they cannot be counted by the eye; the muscular force of the hawk can propel it 150 miles an hour, and the albatross can fly across the ocean without fatigue. Dragons, flying fish, phalangers, and squirrels (*pteryomys*), though well organized in some respects for aerial progression, cannot fly for want of sufficient muscular power; but the extinct pterodactyl shows evidence of having possessed, like the existing bats, extensive powers of flight. The amount of muscular force necessary for flight is so great, that if man could concentrate all the strength employed in a day's labor, he could not support himself in the air for more than five minutes; the accomplishment of flight in man, even with the assistance of any contrivance thus far suggested, may be safely considered an impossibility. The energy of the muscular system of fishes, considering the rapidity with which they move in their dense medium, must be very great. Other familiar examples of muscular power are seen in the constrictions of the boas; the leap of the frog, kangaroo, jerboa, and hare; the speed of the antelope; the spring of the lion; and the strength of the ox and elephant. The muscular power of man is more advantageously displayed by the extent and variety of motion than by actual force; but by scientific training great strength may be obtained from naturally feeble persons. The rapidity of muscular action is familiarly seen in the ventricular contractions of a child's heart, each of which occupies a little more than half a second; in the movements of the vocal cords in rapid singing or speech; and most remarkably in the flight of insects, whose wings strike the air sometimes thousands of times in a minute, by a muscular mechanism and arrangement of elements mentioned under GNAT. Muscle may be hypertrophied from excess of nutrition arising from abundance of formative material, from increased supply of blood, but principally from preternatural formative capacity; the opposite conditions lead to atrophy of muscle. A remarkable change in muscle consists in its fatty degeneration, to which the fibres of the heart are very subject; the muscles of the limbs after paralysis are occasionally thus affected. Throughout the animal kingdom the development of the muscular system is in conformity with that of the nervous system. The vertebral system of muscles is most developed in fishes, the costal in serpents, the hyoid in fishes, the masticatory in vertebrates, the tegumentary in those mammals armed with spines (like the hedgehog and porcupine), and in the unpaired or vertical fins of fishes; those of the voice are most developed in birds, mammals, and man; those of the limbs inversely as those of the spine, and feeblest in fishes; the diaphragm exists in mammals only. The muscles of the hand reach their highest perfection in man, while those of the tongue, eyes, ears, and nose show that many groups of muscles which are

complete in the lower mammals, exist in man in a comparatively rudimentary condition.—Muscles which move a limb in opposite directions are called antagonist muscles. The flexor muscles of the arm, for instance, bend the limb at the elbow joint, and the extensor muscles draw it back, or extend the arm in a direct line; thus these muscles antagonize each other. There is a sort of passive action in the different muscles of the body, constituting what is termed the natural tone of the system; and when this is lost or partially enfeebled in one set of muscles, their natural antagonists have an undue action on the parts, and cause disfigurement by destruction of the natural balance. The form and position of the muscles of the face, for instance, keep up a balance of feature in the natural expression of immobility or stillness; those of one side antagonize those of the other. In paralysis of one side of the face, the muscles of that side are deprived of their natural tone and power of action, while those of the other side retain their tone and power as before; the consequence of which is, that the latter draw the mouth to their side of the face, while the others are unable to counterbalance this action from want of power to act in the opposite direction. Certain muscles are antagonized by the natural elasticity of the parts to which they are attached; the elasticity of the ribs and that of the elastic ligaments of the spinal column may be considered as antagonistic to the natural tone and power of the muscles attached to them, or acting in a contrary direction.

MUSCLE SHOALS. See TENNESSEE RIVER.

MUSCOGEE, a W. county of Georgia, separated from Alabama by the Chattahoochee river, and bounded E. and S. E. by Upatoi creek; area, about 200 sq. m.; pop. in 1870, 16,663, of whom 9,220 were colored. A branch of the Southwestern railroad has its terminus at the county seat. The chief productions in 1870 were 2,140 bushels of wheat, 103,117 of Indian corn, 10,205 of oats, 29,560 of sweet potatoes, 53,147 lbs. of butter, and 5,150 bales of cotton. There were 456 horses, 841 mules and asses, 1,257 milch cows, 2,184 other cattle, and 3,784 swine; 1 manufactory of agricultural implements, 3 of brick, 3 of cotton and 3 of woollen goods, 2 of cotton and woollen machinery, 1 of engines and boilers, 4 founderies, and 5 flour mills. Capital, Columbus.

MUSCOGEES. See CREEKS.

MUSCOVY. See RUSSIA.

MUSCOVY DUCK. See DUCK, vol. vi., p. 289.

MUSES (Gr. *μοῦσαι*), in classical mythology, the goddesses originally of song, and afterward of all kinds of poetry and of the arts and sciences. According to the earliest legends, they had their principal seats in Pieria on Mt. Olympus and in Boeotia on Mt. Helicon. Homer styles them the Olympian, and Hesiod the Heliconian; according to the latter, however, they were born on Olympus, and dwelt at a short distance from the pinnacle on which

Jupiter was enthroned, whence they visited Helicon to bathe in Hippocrene, and celebrate their choral dances around the altar on the top of the mountain. K. O. Müller infers, from the fact that the worship of the muses originally flourished on the same mountain which was represented as the common abode of the gods, that it was the poets of that region, the ancient Pierian minstrels, whose imagination created and arranged the Olympian council. Elsewhere they were chiefly honored as the nymphs of fountains. They were commonly esteemed the daughters of Jupiter and Mnemosyne, but were also called daughters of Cœlus and Terra (Uranus and Ge), of Pierus and a Pimpleian nymph, of Jupiter and either Plusia, Moneta, or Minerva, of Apollo and Plusia, and of Æther and Terra. Their number was variously given at first as either three, four, or seven, but was at length established and recognized as nine throughout Greece. Hesiod first states the names of all the nine, by which they are usually designated: Clio, the muse of history; Euterpe, of lyric poetry; Thalia, of comedy; Melpomene, of tragedy; Terpsichore, of choral dance and song; Erato, of erotic poetry; Polyhymnia, of the sublime hymn; Urania, of astronomy; and Calliope, of epic poetry. In Homer as in later authors they sing festive songs at the banquets of the gods, and are invoked by mortal poets to bring before the mind the events which they have to relate, and to confer the gift of poetry. They punished Thamyris, who had presumed to excel them, with blindness; stripped the sirens, who had ventured on a contest with them, of their wings; and metamorphosed the nine daughters of Pierus, who sought to rival them, into birds. Though usually regarded as virgin divinities, the greatest mythical bards, such as Linus and Orpheus, were called their sons. Apollo, as the god of the lyre, led their choir, and they themselves had the gift of prophecy. They were worshipped with libations of water or milk and honey, received various designations from the poets according to the places that were sacred to them, and were represented each with particular attributes in works of art.

MUSEUM (Gr. *μουσείον*, a temple of the muses), a repository of objects relating to history, science, or the arts. In the modern sense of the term the temples of Apollo at Delphi and Juno at Samos, and the acropolis at Athens, as receptacles of works of art, were museums. In history the name was first applied to the academy founded by Ptolemy Philadelphus at Alexandria. Cosmo the Elder began the first of the now celebrated galleries of Florence, and to him is due the conception of the museum in its modern signification. Pope Julius II. founded the museum of the Vatican. During the 16th and 17th centuries the museum mania led to the stripping of the provinces of works of art, which were collected in the capitals; and thus were begun the great museums and galleries in nearly all the

leading cities on the continent. Besides paintings and statuary, many of the museums comprise collections of bronzes, medals, gems, cameos, and intaglios. The Ashmolean museum in Oxford, founded about 1680, is the oldest in England; and the British museum in London, established in 1753, is the most important in the world. In some of the European cities there are special repositories, like the Thorwaldsen museum in Copenhagen and that in Paris established by Plon in the Louvre in 1875. The celebrated collections are described in this Cyclopædia under the names of the cities in which they are situated; and the more prominent, such as the British museum, the Louvre, and the Vatican, are described under their own titles. There are also special museums, which are mentioned in connection with the places or institutions to which they belong.

MUSEUM OF NATURAL HISTORY, The American. See supplement.

MUSGRAVE, George. See supplement.

MUSHROOM (Fr. *mousseron*, from *mousse*, moss, because mushrooms are often found growing in it), the name of several edible fungi, chiefly of the genus *agaricus*. The genus is large, and contains the most highly organized forms found among fungi; the number of species known to be edible is few; untested agarics, and those known to be poisonous, together with other fungi of similar appearance, are popularly called toadstools. The agarics have an abundant mycelium, known to gardeners as the spawn, consisting of white, cottony filaments, which spread in every direction through the soil; this, which is the vegetative portion of the plant, grows quite out of sight. That which is popularly recognized as the mushroom corresponds to the inflorescence in other plants; this appears upon the mycelium as a small knob, and soon pushes its way to the surface, where it is at first nearly spherical, but it rapidly develops and shows its various parts. There is a stem, bearing at its top an expanded, umbrella-shaped portion, the *pileus* or cap. In the button state, the covering or skin of the cap (*volva*) is attached to the stem, but as the cap expands this breaks away, leaving a fragment upon the stem, known as the ring or *annulus*. Upon the under side of the cap are numerous thin vertical plates, radiating from the stem, but not attached to it; these are the *hymenium*, popularly called the gills; a thin transverse section of one of these plates, when highly magnified, shows its surface to be studded with large cells terminating in four points, each of which bears a spore. The different species of *agaricus* present great variety in the form and size of the cap, and the color and character of its surface; the gills and the spores vary in color, which serves to divide the genus into groups according as they are white, pink, rust color, purplish brown, or black. Mushrooms grow wild in Europe and America, and a majority of the edible spe-

cies are common to both. In the articles FUNGI and LYCOPERDON reference is made to the recent attempts of English naturalists to increase the list of edible fungi, and to popularize them as articles of food. In this place are enumerated the principal species which have received the name of mushroom, and are common to both England and the United States.—Locality appears to have much to do with the quality of mushrooms. Some of the agarics which are highly esteemed in England have here proved unpalatable, and the common mushroom, *A. campestris*, so generally eaten elsewhere, is not only rejected in the markets of Italy, but is regarded with dread. This varies considerably, but in all cases is to be distinguished by its white, firm, solid stem, its fleshy cap, and its pink gills; when the cap begins to expand the gills are pale, but they soon become pink, and on this account it is in some parts of this country

being them with salt and flavored with spices. The general testimony is that mushrooms are highly nutritious, but difficult of digestion, and unsuited to persons with delicate stom-



Horse Mushroom (*Agaricus arvensis*).

achs.—The horse mushroom (*A. arvensis*), called snowball in the southern states, has a hollow stem, with a broad, pendulous ring; a slightly conical cap; the gills brownish white, and never of the pure pink color of the preceding; while the common mushroom rarely excels 3 or 4 in. across, this is sometimes more than a foot; it turns brownish yellow when broken. This species is quite common, and in English markets is much more abundant than the other. The parasol agaric (*A. procureus*) has a stem 6 or 8 in. high, hollow, with a loose pith, and tapering upward from a pear-like bulb at the base; ring loose on the stem;



Common Mushroom (*Agaricus campestris*).

known as the pink-gill; when older the gills become chocolate-colored and then tawny black, in which state they are regarded as unfit for food. It has a pleasant and characteristic odor, by which those familiar with it can distinguish the plant. This species is found in pastures, and in some years in great abundance; its proper season is September and October, when our markets are abundantly supplied from the wild growth; at other times cultivated mushrooms are to be had, but at very high prices. This is the only species cultivated. Mushrooms resemble flesh in flavor more nearly than do any other vegetables, and it is asserted by Badham that they contain similar proximate principles. They are used to form a dish by themselves, either stewed, broiled, or baked, and are largely employed to flavor other dishes, entering into a great variety of stews, fricassees, and sauces; many are consumed in the preparation of catsup, which is the juice of the mushrooms extracted by sprin-



Parasol Mushroom (*Agaricus procureus*).

the cap when expanded is 3 to 7 in. across, with a blunt point in the centre, and with a brown and more or less torn cuticle; gills white. According to the late Mr. Curtis, this

when fresh has the flavor of a hazel nut, and he calls it the nut mushroom; he considers that this flavor, together with the movable ring upon the stem and the brown color, will allow of its ready identification. In England this ranks as one of the finest flavored, and those who have tried it here coincide in the opinion. *A. prunulus*, *A. rubescens*, and *A. nebularius* are species common to both England and the United States. The favorite mushroom of Italy, *A. Cesareus*, regarded as the most delicious of all fungi, was found abundantly in North Carolina by Mr. Curtis, who called it the imperial mushroom.—The French call all mushrooms *champignons*, but in England the name is restricted to the fairy-ring champignon, which is by some called *agaricus oreades*, and by other authors it is placed in the genus *marasmius*. The fairy rings which are so common in pastures and lawns in England are circles of bright green in the grass of a few feet to several yards in diameter; these are produced by the mycelium of fungi which, having exhausted the soil within the ring, is constantly spreading and enlarging the circle. The champignon is the most important of these fungi; it is only 1 or 2 in. in diameter, with a very tough stem; the cap is dull fawn color when moist, and when dry creamy white, with the gills of the same color, broad and far apart. A very acrid champignon, *A. urens*, has a similar appearance, but the gills are narrow and much crowded. The champignon is one of the most

structures, being of wood and underground, decayed and fell to ruin before the success of



Chantarelle (*Cantharellus cibarius*).

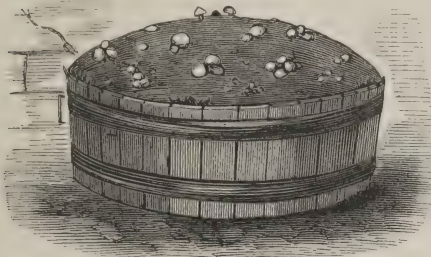
the project was established. Occasionally a florist may make a bed for mushrooms under the stage of his greenhouse, and from these and other sources there is a scanty supply of fresh mushrooms; but except during the autumn months restaurants and hotels depend upon those imported from France in sealed tins. The mushroom appears to be dependent upon the horse, it being supposed that the spores are taken into the animal with the grass it eats, and germinate in the droppings; the manure of horses and cattle is the medium in which the mycelium of the mushroom flourishes most vigorously; hence in cultivation an abundant supply of this is required, and also a stock of mycelium or spawn. The earth of riding schools, or that from the track of a horse mill, in which the droppings of the horses are thoroughly beaten into the soil, is found to afford an abundant supply of spawn; when once obtained it can be multiplied to any extent, and, as it retains its vitality when dry, can be transported; that sold in this country comes from Europe. Horse and cow droppings and loam are mixed together and formed into blocks like large bricks; when these are partly dry, a hole is made in each and a small piece of spawn inserted; the bricks are then placed upon a hotbed and kept at a temperature of 60° F. until the whole mass of each is permeated by the threads of the mycelium; further development is then checked by completely drying the bricks, and afterward they are stacked away in a dry place for use or for sale. Mushrooms are grown in houses built for the purpose, in out buildings, cellars, caves, or wherever a uniform temperature of between 50° and 60° can be maintained. Cultivators vary so much as to details that general principles only can be stated. Some use pure horse droppings, others mix these with those of cattle; the beds are made of the fermenting manure built up solidly and large enough to maintain a heat of about 70°. The bed being of



Fairy Ring Champignon (*Marasmius oreades*).

highly flavored fungi, and may be kept in the dry state for years without losing its aroma.—The chantarelle (*cantharellus cibarius*), one of the esteemed rarities in England, was found in great abundance in North Carolina, but was not relished by Mr. Curtis or his friends. Mr. Curtis in a letter to the Rev. Mr. Berkeley stated that he had eaten 40 species of edible fungi collected within two miles of his residence, and that he had detected 111 kinds in North Carolina alone.—The cultivation of mushrooms, which is so largely practised abroad, is in this country mainly confined to private gardens; an attempt was made by the late Prof. Blot to cultivate them on a commercial scale, but his

the proper temperature, bits of a brick of spawn are inserted in it at intervals, and when



Mushrooms grown in a Cask.

the mycelium is growing rapidly, or the spawn "runs," about two inches of soil are placed upon the bed, and it is then covered with straw; water is applied if necessary, and it should be warmed to the temperature of the bed. Mushrooms appear in six or eight weeks, and are collected when in the button state or larger as required; it injures the bed to cut the mushrooms, hence they are twisted off. Instances are given of successful cultivation in tubs made by sawing a cask in two, in boxes which are stacked upon each other, upon shelves



Mushroom Cave.

in a stable, and in other unusual places. In England beds are profitably made in the open air, but with us the extremes of temperature are too great for this kind of culture. Mushroom culture is conducted upon the largest scale in the vicinity of Paris, where there are extensive caves formed by the removal of building stone; these caves are from 20 to 60 ft. deep and of great extent; one of them contains 16 m. of mushroom beds, and in another the beds measured one year over 21 m. in length. As the plant does not require light, and as these caves have the requisite uniformity of temperature, they are utilized by the mushroom cultivators, who, notwithstanding

the labor and difficulty of bringing the immense quantity of manure to the spot, find it a profitable business. One of the large quarry plantations when in full bearing sent 3,000 lbs. of mushrooms to the Paris market daily.—Notwithstanding the efforts that have been made abroad to add various neglected fungi to the food supply, the fact that there are many which are highly poisonous has confined the use of all but the commoner species to a very few enthusiastic amateurs. Unfortunately there is no general rule for distinguishing the wholesome from the harmful; the colors produced by contact with a silver spoon or by the action of salt have been proposed, but are fallacious, and the only guide to be relied upon is an eye educated to observe the peculiarities of structure, color, &c., which characterize the various species. As a general rule, the wholesome fungi have an agreeable smell and taste, and all those with a repulsive odor and an acrid taste in the fresh state should be rejected.—Most of the general treatises upon gardening have a chapter on mushrooms. Descriptions of species will be found in Badham's "Esculent Funguses of England" (London), Cooke's "Handbook of British Fungi" (2 vols., London, 1871), and the numbers of the "Gardeners' Chronicle" (weekly, London) for several years past. For cultivation, see Robinson's "Mushroom Culture" (London, 1870).

MUSIC (Gr. *μουσα*, a muse), an agreeable combination and arrangement of sounds, and the art of so combining and arranging sounds. It is indispensable to have some knowledge of the nature of sounds before we begin the consideration of the manner in which they are arranged and compounded in music. We here give only that information which is essential to the understanding of the subject of this article, referring the reader to the article **SOUND** for a discussion of the nature of sonorous vibrations and of their properties. The more rapidly the sonorous pulses of the ear follow each other, the higher is the pitch of the sound perceived. Thus, the gravest sound which is really musical is caused by 40 vibrations a second, while the auditive sensation the highest in pitch is produced by about 40,000 a second. But the sounds employed in music have not so extended a range; they are practically embraced by about seven octaves, extending from 40 vibrations to about 5,000 a second. The gravest sound of an orchestral instrument is the E of the contra-bass, of 40 vibrations a second. Modern pianos and organs indeed give generally the C (of 33 vibrations) below the E of the contra-bass; and some recent grand pianos extend as low as the A (of 27 vibrations) in the next lower octave. In the largest organs there is also sometimes a pipe which gives a sound that descends into the yet lower octave, reaching the C of $16\frac{1}{2}$ vibrations. But none of these grave sounds below the E of the contra-bass can be termed musical; for the separate pulses which compose them do not

blend into smooth continuous sensations, but produce beats, corresponding in number to the rate of vibration indicated above. These grave sounds cannot be used alone, but are always sounded in unison with pipes or instruments giving their higher octaves and harmonics. Thus the latter are compounded with the harsh fundamental of the grave note, and at the same time blend with any harmonics which may accompany the fundamental of these grave sounds. In the higher regions of musical sounds, pianos give the notes A and even C, of 3,520 and 4,224 vibrations. The most acute sound of orchestral music is the D (of 4,752 vibrations) of the piccolo flute.—There are three distinctions to be made among sounds: their pitch, of which we have just spoken; their intensities, concerning which it is not necessary to enlarge; and their *timbre*, or that character by which we distinguish between sounds having the same pitch and intensity. All simple sounds, which we define as those having only one pitch, have the same timbre. Such are the sounds given by flue organ pipes, or by tuning forks when mounted on resonant boxes. But the sounds employed in music are always composite, being formed of several simple sounds whose numbers of vibrations are to each other generally as 1, 2, 3, 4, &c. Simple sounds are unfit for musical expression by reason of their want of brilliancy; for this reason the notes of closed flue pipes are rarely sounded alone, but to invest their tones with feeling and life they are combined with other stops, giving the harmonics or furniture of their simple sounds. The sounds of the flute approach in character those given by closed organ pipes; but when associated with other instruments which bring out the sequence of the harmony, the flute, by reason of the perfect softness of its sounds and the facility with which it renders rapid movements, is charming, and cannot be replaced by any other instrument. It held a far more important place in ancient than in modern music; but even among the ancients the abler masters preferred the more thrilling sounds of stringed instruments. The sounds of all other instruments, as well as the notes of the human voice, are composite, formed by the blending of several simple sounds, having different positions in the musical scale. (See HARMONY.) Helmholtz has proved that the distinctive timbre of any given sound is due to the number and relative intensities of its elementary sounds, or harmonics.—Stopped wooden flue pipes of large section give nearly simple sounds when blown with a feeble pressure. An increase of pressure in the blast develops the third harmonic, and an excessive pressure may injure the timbre of the sound by giving to it too great an intensity compared with that of the fundamental; it may even cause the latter to disappear, and then the whole sound will have risen in pitch by an octave and a fifth. Stopped organ pipes having small area of section

compared with their lengths give the fifth harmonic as well as the first and third. In other words, closed pipes give the uneven harmonics; open and narrow pipes give the complete series of harmonics up to a certain number. Thus, if we close all the holes in a flute and blow gently, and then with increasing intensity, the instrument will successively give the first, second, third, and fourth harmonics. In the case of the narrow open pipes in the organ (viola, principal, violoncello, contra-bass, viola-di-gamba), powerful pressure of wind gives the fundamental sounds of these pipes accompanied by the clear sounds of all the harmonics, including the sixth. It is quite otherwise in the case of the large open pipes. From the considerable mass of air which they contain, and from the fact that they do not readily jump in their pitch from the fundamental to one of the harmonics on increasing the wind pressure, these large pipes form the basis of the mass of sounds of the organ, and hence they have been called the principal register. In these pipes the fundamental sound is intense, and is accompanied by a few harmonics of feeble intensities. In the flute or chimney pipes, the timbre receives a brilliant character from a small open pipe adapted to the top of these closed pipes. By combining the stops on the organ, one can produce a great variety of timbre; and in this regard the organ has the advantage over all other musical instruments. Vibrating plates, or reeds, are used in the reed pipes of the organ, in the melodeon, and in the clarinet, hautboy, and bassoon; while in the horn, trumpet, trombone, and cornet the lips perform the office of the reed. The sounds of all reed instruments are peculiarly rich in harmonics; it is not difficult to distinguish those even as high as the twentieth. The fundamental, or some powerful harmonic, is generally reinforced in reed organ pipes by surmounting them with open or partly closed tubes of various sizes and forms; and thus are obtained the various timbres of these instruments, such as the trumpet, *vox humana*, &c. The clarinet gives only the odd series of harmonics, 1, 3, 5, 7, &c., while the hautboy and bassoon give the entire series, 1, 2, 3, 4, &c. If the hautboy takes one note of an interval and the clarinet another, some concords will sound best when the former instrument, others when the latter takes the upper note. Among stringed instruments those of the violin kind occupy the highest place. The tones of these are highly complex, containing the clear sounds of the higher harmonics from the sixth to the tenth; and as violins do not, like the piano, give fixed sounds evolved by a keyboard, they have great sonorous flexibility, giving the performer the power of playing in any mode or scale, and of gliding from one note to another without perceptibly breaking the continuity of the sound; and above all, he can obtain any note with varying intensity, and thus express his feelings by the most exquisite modulation.

When the violin is well played, the fundamental or lowest harmonic comes out with force, and the harmonics up to the sixth are feebler than in the cases of the guitar, harp, or piano; but the sixth and higher harmonics are stronger than in the case of the latter instruments. On examining with a vibration microscope the forms of the vibrations of the strings, Helmholtz found that in instruments of the highest excellence these forms remained constant during the whole duration of the tone. To this great regularity in the vibrations he attributed the purity of the sounds of old instruments; and for the same reason the strings can be sounded with more force. In the piano the sounds are composite; the lower harmonics are relatively stronger than in the violin, but the harmonics above the sixth, which in the main form dissonant combinations with those

below the sixth, are purposely prevented from appearing in the sounds of this instrument, by causing the hammers to strike the strings at points distant from the ends of the strings about one seventh of their length. The sounds of the harp and guitar differ from those of the piano; for in these instruments we have catgut strings which are pulled aside from their positions of equilibrium, and then allowed to vibrate freely; in such circumstances the higher harmonics, which appear in the first swings of the cords, soon disappear from their sounds. But no instrument emits sounds so smooth, so clear, and so touching as those of the human voice. The voices of men are classed as bass, barytone, and tenor; those of women as contralto, mezzo-soprano, and soprano. The position on the musical scale and the range of these voices are given as follows in musical notation:



We thus see that ordinary voices do not include two full octaves. The range from the lower F of the bass to the higher G of the soprano is a little more than three octaves. These limits, however, have been extended in exceptional cases. Prætorius, in his *Syntagma Musicum*, says that in the 16th century, in the time of Orlando di Lasso, there were at the court of Bavaria three basses, the brothers Fischer and one Gassner, who sang the F_{-1} ; while the highest note ever recorded is that attained by Lucrezia Ajugari, called La Bastardella.



Mozart, who heard her at Parma in 1770, gives several passages which she sang for him. We copy the last of them, which ends in C_6 :



She trilled on the D_6 and performed other extraordinary feats. Mozart's father says that La Bastardella sang these passages with a little less force than the lower notes, but that her voice remained as pure as a flute. She could descend easily as far as G_2 . Kuhlau wrote for a songstress who astonished St. Petersburg in 1823 the part of Adelaide in his opera of *Le château des brigands*. The dominant air in the third act reaches as high as A_6 . "At one representation, just as she was about to give the perilous note, the leader of the orchestra looked at her fixedly, which so disconcerted her that she gave C_6 ." The voice of Gaspard Forster embraces three octaves, from A_{-1} to A_6 ; while that of the younger of the Sessi sisters extends through three octaves and a half, from C_2 to F_6 . Catalani's voice had likewise a compass of three and a half oc-

taves, as also had the voice of Farinelli, who went from A to D_6 .



Very remarkable heights have likewise been reached by Nilsson and Carlotta Patti. At the age of puberty the glottis of man suddenly enlarges, and the voice ordinarily descends in pitch an octave. This change does not take place in castrates; their voices remain as in their childhood, and are distinguished by an indescribable flute-like quality. But cases are on

record where the voice has never acquired the pitch characteristic of manhood; thus, M. Dupont, who often sings at the celebration of high mass in Paris, has a remarkably fine soprano voice, yet he is 36 years old (1874), and is the father of several children.—In music we consider the ratios of the numbers of vibrations of definite sounds more than the absolute number of the vibrations, or pitch, of these sounds. From the most ancient times it has been known that the most harmonious concords are produced by means of the simultaneous sounding of strings whose lengths bear to each other simple ratios. Pythagoras, who probably derived the fact from the Egyptians, says that when the ratio of the lengths of the strings was as 1 : 2, the grave note sounded in unison with its octave, while the ratio 2 : 3 gave the *quint*, and 3 : 4 gave the *quart*. We now know that the numbers of vibrations of similar strings are inversely as their lengths, so that the existence of the above consonant intervals depends alone on the ratio of the vibrations of the strings, and not on the absolute number of vibrations of the fundamental note of the chord. (See HARMONY.) When we double the number of vibrations corresponding to a note, we obtain the octave of this note, and the sensation caused by this higher octave seems to repeat that which corresponded to the lower. This interval of the octave, which includes all the notes of any musical system, is established by our physiological constitution, and was determined long before it was known that to obtain the octave of a note we had to double the number of its vibrations. Modern science has shown that the following musical consonances are only obtained when their constituent notes have the following vibration ratios: octave, 1 : 2; fifth, 2 : 3; fourth, 3 : 4; major third, 4 : 5; minor third, 5 : 6; major sixth, 3 : 5; minor sixth, 5 : 8. Within the compass of the octave are seven distinct steps of pitch, constituting the gamut. We here give the names of the notes of the natural gamut in English and German, and in Italian and French notation. Under these names we give the relative numbers of their vibrations in whole numbers and in fractions; and in the succeeding line are the intervals between the notes of the gamut:

Names.	{	C	D	E	F	G	A	B	C
	{	<i>ut</i> or <i>do</i>	<i>re</i>	<i>mi</i>	<i>fa</i>	<i>sol</i>	<i>la</i>	<i>si</i>	<i>do</i>
Ratio of vibrations.	{	24	: 27	: 30	: 32	: 36	: 40	: 45	: 48
	{	1	: $\frac{3}{2}$	: $\frac{5}{4}$	: $\frac{4}{3}$	: $\frac{3}{2}$	: $\frac{5}{3}$	: $\frac{15}{8}$	: 2
Intervals between successive notes.	{	$\frac{9}{8}$	$\frac{10}{9}$	$\frac{16}{15}$	$\frac{9}{8}$	$\frac{10}{9}$	$\frac{8}{7}$	$\frac{16}{15}$	

The gamut does not suppose a knowledge of the absolute height of the notes; it only fixes the ratios. The first note, or tonic, can have any pitch; but once fixed upon, all the others must follow in the ratios of the above numbers; thus, if C makes 240 vibrations, then D in the same time must give 270, E 300, F 320, and

so on. One gamut is continued by a second, formed by simply doubling the numbers of vibrations constituting the first, and another by doubling the vibrations of the second, and so on. The ratios between the successive notes of the gamut and the first note, or tonic, are denominated their musical intervals. In the following table we give the names of the intervals preceded by the names of the notes. These intervals are designated by the position of the notes in the gamut:

C : C	Unison	1 : 1
C : D	Second	8 : 9
C : E	Third	4 : 5
C : F	Fourth	3 : 4
C : G	Fifth	2 : 3
C : A	Sixth	3 : 5
C : B	Seventh	8 : 15
C : C ₂	Octave	1 : 2
C : D ₂	Ninth	4 : 9
C : E ₂	Tenth	2 : 5
C : F ₂	Eleventh	3 : 8
C : G ₂	Twelfth	1 : 3
.....
C : C ₃	Double octave	1 : 4
.....
C : E ₃	Seventeenth	1 : 5
.....
&c.	&c.	&c.

The first six notes received their present Italian names from the Benedictine Guido Aretino in 1026. They are the first syllables of the words taken from the following stanza of the hymn to St. John the Baptist:


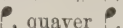
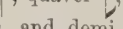
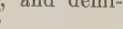

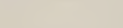
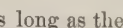
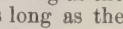

UT queant laxis *RE*sonare fibris
*MI*ra gestorum *FA*muli tuorum,
*SO*lve polluti *LAB*ii reatum,
 Sancte *JO*hannes.

The air to which this hymn is now sung at Rome on St. John Baptist's day is altogether different from that used by Guido, for in ancient times the six syllables were sung to the notes which these syllables designated. The word *si*, derived from the fourth line (S and I), was first used by François Lemaire in 1684 to designate the seventh note of the gamut. The use of these words in solmization caused the Italians to change the *ut* into *do*. These names for the notes did not spread very rapidly, for during the time of Jean de Muris, in the 14th century, they still sang at Paris the syllables *pro*, *to*, *no*, *do*, *tu*, *a*; but finally Guido's names prevailed, except in Germany and England, where the notes are generally designated by the letters C, D, E, F, G, A, B (or H). The origin of the latter nomenclature is as follows: Before the 6th century, certainly during the time of Gregory the Great, they formed a series of gamuts corresponding to the ordinary range of the notes of the human voice, and of the principal musical instruments then in use. The notes were designated by the first seven

letters of the alphabet, in this manner: A, B, C, D, E, F, G; a, b, c, d, e, f, g; aa, bb, cc, dd, ee. Subsequently they added another note lower in pitch than those already embodied in their system, and this note was indicated by the Greek *gamma* (γ), whence the name gamut. Others say that gamut comes from the fact that the letter γ was placed on the lowest line of the staff. Guido replaced the letters by points which he wrote on parallel lines (the staff), each of which belonged to a certain letter, called the key or clef of that line. Thus when an F had been written at the beginning of a line, it indicated that all points on that line represented the note F. Afterward they enlarged these points, placed them between the lines, and increased the number of the lines and spaces as they were needed. In order to indicate a chord, or the simultaneous sounding of two or more notes, these notes were placed one below the other, and from this method of notation arose the name of counterpoint, or the science of accords. Musical notation at first only indicated the heights of the various notes on the musical scale; in 1338 De Muris invented squares to indicate their duration. This system was improved by Ottavio Petrucci (1470), who in 1502 was the first to print music by means of movable types. The syllables *do, re, mi, fa, sol, la* did not originally stand for fixed notes, but simply the degrees of any gamut whatever. They stood for the hexachord of Guido, and were written below the letter which designated the fixed gamuts, beginning with C, with F, or with G:

C	D	E	F	G	A	B	c	d	e	f	...
do	re	mi	fa	sol	la	.	.	.	.	.	.
.	do	re	mi	fa	sol	la	.	.	.	.	.
.	.	do	re	mi	fa	.	.	.	.	.	.

Thus the same note could occupy different positions in the movable gamut, which was often incompatible with the preservation of the established intervals of the notes, *do, re, mi, fa, sol, la*. Hence arose different modes, more or less harmonious, and a great confusion in the ancient system of music. They then felt the necessity of changing slightly the pitch of certain fixed notes when, by the transposition of the movable gamut, the intervals of the corresponding fixed notes did not give the intervals originally given to the series *do, re, mi, fa, sol, la*. Thus, when *do* was written below F, and *fa* below B, the interval of F to B should have been a fourth; but as in reality it was greater, they diminished it by flattening B a semitone. The latter note was then called *B molle*, while it was *B durum* in the gamut which began in C. They indicated these changes by writing a *b*, round or square, and this is the origin of the signs \flat and \natural . The origin of these signs is shown in the French language, in which they are respectively termed *démol* and *bécarre*. By many modifications musical notation grew into the present system.—The signs now em-


ployed in music denote the length, pitch, and force of tones, or rhythm, melody, and expression. The length of a note is represented by its shape. The notes are the breve  or , semibreve , minim , crotchet , quaver , semiquaver , demisemiquaver , and demi-quaver , but the first and last of these are


little used. The breve is twice as long as the semibreve, the semibreve twice as long as the minim, and so on. A dot following a note lengthens it one half, thus, $\dot{\text{c}} = \text{c} + \text{half c}$. Rests, indicating silence, are: — , equal in length to c , or a whole bar; — = c ; — = c ; — = c ; — = c ; — = c ; — = c . Rhythm is fur-

ther marked by the division of time into measures of equal length indicated by vertical lines drawn across the staff. Measures again are divided into two, three, four, or six parts, and the first part of a measure is almost always accented. There are four measures in common use: double, triple, quadruple or common, with a secondary accent on the third part, and sextuple, with a secondary accent on the fourth part, each represented by figures placed at the beginning of the staff, as follows:


$\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$ or C , and $\frac{6}{4}$ or $\frac{6}{8}$.


Thus, taking the crotchet as a standard, in double time there must be two crotchets or their equivalent in every bar or measure, in triple three, in quadruple four, in sextuple six. There are exceptions to these rules, however, and even five crotchets to a bar have been used with eccentric effect.—The pitch of a tone is determined by its position on the staff, which consists of five parallel lines and the four intervening spaces, and by the clef, which indicates the pitch of all the notes on one line or space of the staff, whence the rest are easily found. In the early Italian school every kind of voice had its own clef, but at present only two are in general use, the treble or G clef

of the violin, , and the bass or F clef,

. In some musical scores, however, par-

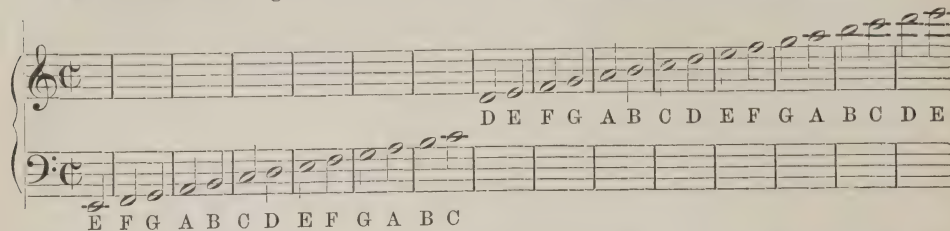
ticularly Italian, the C clef is retained for the tenor and alto parts. For the former it is placed

on the fourth line, , which thus be-

comes the position of C, and for the latter on the third, . The popular plan in wri-

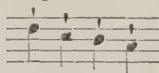
ting music in four parts is to put the alto on the same staff with the treble, and the tenor with the bass or treble. With these staves, and the aid of short lines called leger lines above and

below the staves, we are able to represent all the notes of the human voice, and even more. The following is the musical scale from the lowest bass note to the highest soprano:



The pitch of any note may be raised half a tone by means of a sharp (#) placed before it, or lowered half a tone by a flat (b). When a sharp or flat is placed on a line or space at the beginning of a staff, it affects every note occurring on that line or space and its octaves throughout the piece. A natural (♮) restores to its normal pitch a note affected by a flat or sharp. A note or passage may be raised or lowered an octave by writing over or under it the sign 8va. ----- Besides the words *forte*, *fortissimo*, *piano*, *pianissimo*, and their abbreviations, *f.*, *ff.*, *p.*, *pp.*, indicating that a note or passage is to be given loud, very loud, soft, or very soft, there are the signs < (*crescendo*), denoting a tone gradually increasing from soft to loud; > (*diminuendo*), the reverse of crescendo; > (*sforzando*), an explosive tone

instantaneously diminished;



(*staccato*), a short articulate utterance as if each

note were followed by a brief rest; and



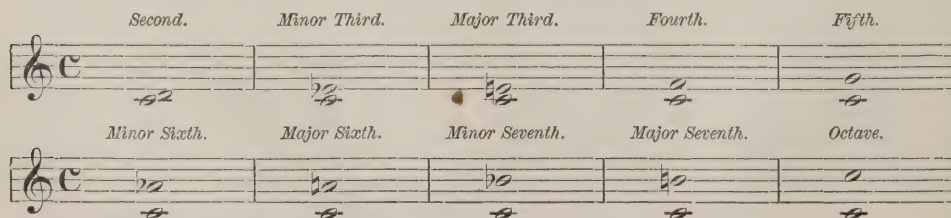
(*legato*), a binding together of successive tones. The system of musical notation adopted indicates to the performer the pitch, the duration, and in an imperfect manner the intensity of musical sound, but conveys no idea of the timbre or composition of these sounds. A musical note, indeed, gives merely the pitch of the fundamental or first harmonic of a musical sound. This defect is unavoidable, and to the musician is generally of little consequence; for in concerted music the parts are written for special instruments, whose qualities of sound are well known to the musical ear.—It was only after ages of experience, and many changes, that the system of music reached its

present condition. The principal problem was this: Whatever the note selected from the scale to begin the gamut, the other notes when combined with the former shall give the established musical intervals. In order to solve this problem, the fixed notes were altered, either by elevating them in pitch by a semitone, which operation is called sharpening a note, and is indicated by the sign #, or by lowering them a semitone in pitch, which is to flatten a note, and is indicated by the sign b. For the value of this semitone the interval $\frac{3}{4}$ has been adopted, which is smaller than the ratio $\frac{1}{2}$, the value of the interval E F. The notes C, D, E, &c., are given by the white keys of the piano and organ, while the black keys give the sharps and flats. The gamuts are always designated by the name of their first note, or tonic. All the gamuts called major are modelled on the primitive gamut of C, formed by the series of natural notes, C, D, E, &c. The gamut of G is formed of the notes G, A, B, C, D, E, F#, G; that of F, of the notes F, G, A, Bb, C, D, E, F. These gamuts constitute the major mode. Music, however, requires also a minor mode, formed of gamuts whose type is the gamut of A minor: A, B, C, D, E, F, G, A. The principal difference between the two modes consists in the introduction of the minor third, A—C (5 : 6), in the place of the major third, C—E (4 : 5). They are both characterized by a perfect accord, formed with the third and fifth of the tonic, as follows:

Perfect major accord, C E G.

“ minor “ A C E, or C Eb G.

The major and minor scales give us a series of 11 notes, which, severally combined with the tonic, form 10 distinct intervals. In musical notation they are as follows:



In the minor mode we are often obliged to elevate by a semitone the seventh and also the sixth note of the gamut. To obtain absolute purity, all gamuts on an instrument of fixed sounds, like the organ or piano, would require an extraordinary, indeed an almost impracticable complication. Mr. A. J. Ellis has shown in a paper published in the "Proceedings of the Royal Society," vol. xiii., "On a perfect Musical Scale," that within the compass of an octave 72 notes would be required to give an absolutely perfect command of all the keys that are now used in music. It has therefore been found necessary to make a compromise, in perfect harmonious effects, in the construction of instruments with fixed sounds; and thus has come about the universal adoption of the musical scale known as that of "equal temperament," so called because between any two contiguous notes the same interval (called a semitone) exists throughout the whole scale. As the octave is divided into 12 equal intervals, it follows that each of these

intervals is equal to $\sqrt[12]{2}$, or to 1.05946. This scale being a compromise, the major triads are slightly dissonant. Thus, in the natural scale the ratio of the vibrations of G : E : G are as 1 : 1.25 : 1.5; but on the scale of equal temperament these same notes bear to each other the vibration ratios of 1 : 1.2599 : 1.4983. Thus it follows that the interval of the major third is sharpened, while the fifth is flattened. If we take the middle octave of the piano for an example, we shall find that E and A are three vibrations a second too sharp, while the fourth and fifth are out of tune by one vibration a second. For convenience of comparison we here give the two scales. The natural scale is placed below the scale of equal temperament. The numbers of vibrations in a sound, correct to the nearest unit, are written under the notes. When the vibration number is a fraction more or less than the number given, the sign + or — is respectively attached to the number. The notes belong to the middle octave of the piano.

C	C#	D	D#	E	F	F#	G	G#	A	A#	B
264	280—	296+	314—	333—	352+	373+	395+	419+	444—	470+	498+
C	D	E \flat	E	F	G	A \flat	A	E \flat	B		
264	297	317—	330	352	396	422+	440	469+	495		

The ratio of the semitones of the tempered scale is approximately $\frac{1}{12}$, and a tone on this scale barely differs from the major tone of $\frac{2}{3}$. This invention has been variously attributed to Neidhart and Werckmeister, to Sebastian Bach, and to Lambert the geometrician. This musical scale was first applied to the clavichord, and Emanuel Bach, son of Sebastian, said a well tuned clavichord was the most accurate of all instruments; this remark is readily understood when it is explained that, from the manner of production of the sounds on this instrument, the higher harmonics, even when evolved, are feeble and soon die out from the sounds, while the resultant tones appear only at the moment the chords are forcibly struck. But all organists know how harshly intervals are given on a stop of reed pipes, or on the furniture register, tuned to the equal-tempered scale. This harshness is due to the imperfect tuning causing the beating of harmonics and resultant tones. An excellent method of comparing the relative effects of natural and of tempered tuning is to listen to a few voices singing a series of sustained chords of three or four parts without accompaniment, and then listen to exactly the same chords with the accompaniment of a piano or melodeon. In the latter case the harshness of the accompaniment is forcibly brought out. One naturally sings perfect intervals, and a violinist with a refined ear will involuntarily play on the natural scale; but if the voice is educated by the accompaniment of the piano instead of the violin, and if the violinist is always accompanying the fixed

tones of an orchestra, then they will both have acquired the habit of rendering the false intervals of the tempered scale.—The vibration fraction of an interval expresses the ratio of the numbers of vibrations performed in the same time by the two notes which form the interval. Thus, the vibration fraction $\frac{2}{3}$ means that while the lower of the two notes, forming a major third, makes four vibrations, the higher of these notes makes five. Therefore, while the lower makes one vibration, the higher makes five fourths of a vibration, or one vibration and a quarter. Conversely, while the higher note makes one vibration, the lower makes four fifths of a vibration. This reasoning is general, and hence follows this rule: Any fraction greater than unity denotes the number of vibrations, and fractions of a vibration, made by the higher of two notes forming a certain interval while the lower note is making a single vibration. Similarly, any fraction less than unity indicates the proportion of a whole vibration performed by the lower note while the upper is making one complete vibration. The rules for adding and subtracting musical intervals are as follows: To find the vibration fraction for the sum of two intervals, multiply their separate vibration fractions together. To find the vibration fraction for the difference of two intervals, divide the vibration fraction of the wider by that of the narrower interval. Thus, a major third added to a fifth gives a major seventh; while a major third subtracted from a fifth leaves a minor third. One of the most common applications of the second rule

is when an interval has to be inverted. The inversion of an interval less than an octave is the difference between it and an octave; *i. e.*, the interval which remains after the first has been subtracted from an octave. Thus, to invert the minor third we divide 2 by $\frac{3}{2}$; or, in other words, we invert the vibration fraction of the interval and multiply by 2. This operation gives us $\frac{5}{3}$; therefore, the inversion of the minor third is the major sixth. Evidently there exists a mutual relation between an interval and its inversion, so that each is the inversion of the other. Thus, the inversion of the major sixth is the minor third. The following three pairs of consonant intervals, embraced within the compass of an octave, have to each other the mutual relation of inversions:

Minor third, . . . $\frac{6}{5}$ — Major sixth, . . . $\frac{5}{3}$
 Major third, . . . $\frac{4}{3}$ — Minor sixth, . . . $\frac{3}{2}$
 Fourth, . . . $\frac{4}{3}$ — Fifth, . . . $\frac{3}{2}$

—Musical sounds of different pitch, simultaneously emitted, form a chord. Chords formed of two notes are called binary chords; those of three notes are called triads. A binary chord is consonant when its two notes form a consonant interval. In a triad there are three intervals: one between its lowest note and the next higher, one between the middle and highest note, and one between the lowest and highest. The triad is only consonant when all three of these intervals are concords. Therefore, to form consonant triads we select a note, then find the others, each of which forms with the bottom note a consonant interval. We then determine whether the interval between the two higher notes is a consonant one; if this be so, then the triad is consonant. To determine all of the consonant triads contained in an octave, above any selected bottom note, we must assign to the middle and top notes every possible consonant position with respect to the fixed bottom note, and reject all such relative positions as give rise to dissonant intervals between those notes themselves. The remaining positions will constitute all the consonant triads which have for their lowest note that originally selected. The intervals at our disposal are: for the mid-

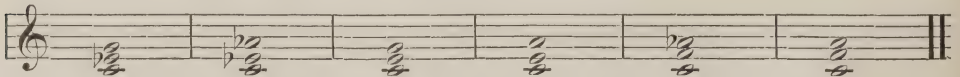
dle note, from the minor third to the minor sixth; and for the upper note, from the major third to the major sixth. In the following table the possible positions of the middle note with respect to the bottom note are shown in the left-hand vertical column, the name of each interval being accompanied by its vibration fraction. The possible positions of the top note are similarly shown in the top horizontal line. Each space common to a horizontal and vertical line contains the vibration fraction of the interval formed between the simultaneous positions of the middle and upper notes named at the beginning of these lines. The intervals thus formed which are dissonant are designated by being enclosed in brackets. Whenever they are consonant the name of the interval is given.

	Major third. $\frac{4}{3}$	Fourth. $\frac{3}{2}$	Fifth. $\frac{3}{2}$	Minor sixth. $\frac{8}{5}$	Major sixth. $\frac{5}{3}$
Minor third. $\frac{6}{5}$	$\left[\frac{25}{24}\right]$	$\left[\frac{10}{9}\right]$	$\frac{5}{4}$ Major third.	$\frac{4}{3}$ Fourth.	$\left[\frac{25}{9}\right]$
Major third. $\frac{4}{3}$		$\left[\frac{16}{15}\right]$	$\frac{6}{5}$ Minor third.	$\left[\frac{32}{25}\right]$	$\frac{4}{3}$ Fourth.
Fourth. $\frac{4}{3}$			$\left[\frac{9}{8}\right]$	$\frac{6}{5}$ Minor third.	$\frac{5}{4}$ Major third.
Fifth. $\frac{3}{2}$				$\left[\frac{16}{15}\right]$	$\left[\frac{10}{9}\right]$
Minor sixth. $\frac{8}{5}$					$\left[\frac{25}{9}\right]$

An examination of the above tables shows that the following are all the consonances:

Middle note.	Upper note.
Minor third.	Fifth, or minor sixth.
Major third.	Fifth, or major sixth.
Fourth.	Minor sixth, or major sixth.

The above consonances are thus expressed in musical notation:



We thus obtain two groups of three major and three minor triads, which may be arranged thus:

- (a) { Fifth. (b) { Minor sixth. (c) { Major sixth.
 Major third. Minor third. Fourth.
 (α) { Fifth. (β) { Major sixth. (γ) { Minor sixth.
 Minor third. Major third. Fourth.

The above six consonant triads may be defined by the intervals separating the middle

from the bottom note, and the top from the middle note, instead of defining these intervals, as we have done above, by the intervals formed by their middle and top notes with the bottom note. To bring about this change we perform on each one a subtraction of intervals. Thus, the difference between a fifth and a major third is $\frac{3}{2} \times \frac{4}{3} = \frac{2}{1}$, or a minor third. In this manner we find that the top and middle notes are separated by the following intervals:

a	b	c	α	β	γ
Minor third.	Fourth.	Major third.	Major third.	Fourth.	Minor third.

Hence the two groups may be written as below :

(a') { Minor third. Major third.	(b') { Fourth. Minor third.	(c') { Major third. Fourth.
(α ') { Major third. Minor third.	(β ') { Fourth. Major third.	(γ ') { Minor third. Fourth.

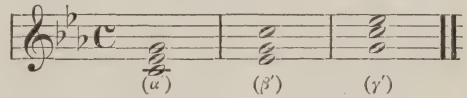
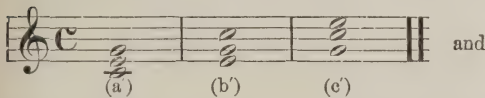
It can now be shown that the triads of each group are closely connected. Take (a'), and form from it another triad, by causing its bottom note to ascend one octave, the other two remaining where they were. The middle will then become the bottom note, the top the middle note, and the octave of the former note the top note. Hence the lower interval of the new triad will be the upper interval of the old triad, *i. e.*, a major third. The upper interval of the new triad will necessarily be the inversion of the interval which separated the extreme notes of the old triad. This interval is

a fifth (see (a)), and its inversion by the table already given is a fourth. Hence the new triad

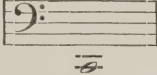
is { Fourth
Minor third }, which is identical with

(b'). If we modify (b') in the same way, the new interval is the inversion of the minor sixth, *i. e.*, the major third, and the resulting triad, viz., { Major third
Fourth }, is identical with

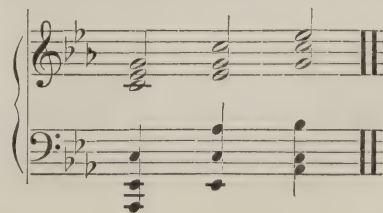
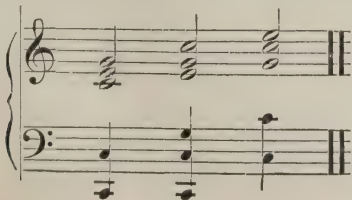
(c'). This triad, when similarly treated, brings us back to (a'), and the cycle of changes is complete. By an extension of the word "inversion," it is usual to call the triads (b') and (c') the first and second inversions of the triad (a'). Exactly similar relations hold between the members of the second group of triads; (β ') and (γ ') are accordingly called the first and second inversions of the triad (α '). The proof is exactly like that just given, and will be easily supplied by the reader. If we choose C as the bottom note of (a') and (α '), the major and minor groups will be expressed in musical notation by



They may also be defined in the language of thorough bass, which refers every chord to its lowest note, in accordance with the mode adopted in (a), (b), (c); (α), (β), (γ). Thus the triads (a'), (b'), (c') would be indicated by the figures $\frac{5}{3}$, $\frac{6}{3}$, $\frac{6}{4}$ respectively, and so would the triads (α '), (β '), and (γ '); the differences between minor and major thirds and sixths being left to be indicated by the key signature. The positions (a') and (α ') are regarded as the fundamental ones of each group, (b'), (c), and (β '), (γ ') being treated as derived from them respectively by inversion. The fundamental triads bear the name of their lowest notes; thus (a') and (α ') are called respectively the major and minor common chords of C. The remaining members of each group are not named after their lowest note, but after that of their fundamental inversion; thus (b'), (c'), and (β '), (γ ') are respectively the major and minor common chords of G in their first and second inversions. The reason of this, as far as the major group is concerned, follows directly from Helmholtz's theory of consonance and dissonance. The notes of the triads (a'), (b'), (c') are all coincident with individual harmonics of a composite sound whose funda-

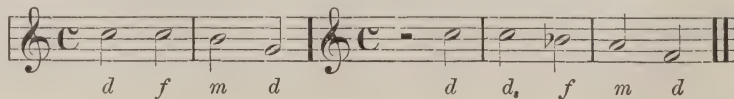
mental tone is the low C  for

(a') and (b'), and the octave above that note for (c'); hence they may be regarded as forming a part of the composite vibration of a C sound, and therefore each triad may be appropriately called by its name. With the minor triads this is not so completely true, because the E \flat in (α '), (β '), and (γ ') is not coincident with an overtone of C. The other two notes, however, are in each case leading harmonics of C, and therefore these triads belong at any rate more to C than to any other note. Common chords of more than three constituent sounds can only be formed by adding to the consonant triads notes which are exact octaves above or below those of the triads. The bright open character of the major and the gloomy veiled effects of minor chords are attributed by Helmholtz to the different way in which combination tones enter in the two cases. The positions of the first order of combination tones, for each of the six consonant triads, are shown in crotchets in the appended staff, the primaries being indicated by minims:



Each interval gives rise to its own combination tone, but, in the cases of the fundamental position and second inversion of the C major triad, two combination tones happen to coincide. The reader will at once observe that in the major group no note extraneous to the harmony is brought in by the combination tones. In the minor group this is no longer the case. The fundamental position and the first inversion of the triad are both in an A \flat , which is foreign to the harmony, and the second inversion involves an additional extraneous note, B \flat . The position of these adventitious sounds is not such as to produce dissonance, for which they are too far from each other and from the notes of the triad; but they cloud the transparency of the harmony, and so give rise to the effects characteristic of the minor mode. The unsatisfying character of minor compared with major triads comes out with peculiar distinctness on the melodeon; as indeed, from the powerful combination tones of that instrument, we should naturally have anticipated.—Sedley Taylor, from whose work "On Sound and Music" nearly all of the above passage on inversion is taken, says: "The musical notation in ordinary use evidently takes for granted a scale consisting of a limited number of fixed sounds. Moreover, it indicates directly absolute pitch, and only indirectly relative pitch. In order to ascertain the interval between any two notes on the staff, we must go through a little calculation, involving the clef, the key signature, and perhaps, in addition, 'accidental' sharps or flats. Now these complications, if necessary for pianoforte music, are perfectly gratuitous in the case of vocal music. The voice wants only to be told on what note to begin, and what intervals to sing afterward; *i. e.*, it is concerned with absolute pitch only at its start, and needs to be troubled with it no further. Hence, to place the ordinary notation before a child who is to be taught to sing, is like presenting him with a manual for learning to dance, compiled on the theory that human feet can only move in twelve different ways. Not only does the established notation encumber the vocalist with information which he does not want; it fails to communicate the one special piece of information which he does want. It is essential to really good music that every note heard should stand in a definite relationship to its tonic or key note. Now there is nothing in the established notation to mark clearly and directly what the relation ought in such case to be. Unless the vocalist, besides his own part, is provided with that of the accompaniment, and possesses some knowledge of harmony, he cannot ascertain how the notes set down for him are related to the key note and to each other. The extreme inconvenience of this must have become painfully evident

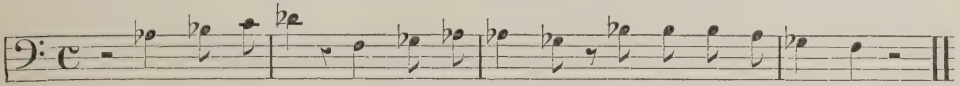
to any one who has frequently sung concerted music from a single part. A bass, we will suppose, after leaving off on F \sharp , is directed to rest thirteen bars, and then come in *fortissimo* on his high E \flat . It is impossible for him to keep the absolute pitch of F \sharp in his head during this long interval, which is perhaps occupied by the other voices in modulating into some remote key; and his part vouchsafes no indication in what relation the E \flat stands to the notes or chords immediately preceding it. There remains then nothing for him to do but to sing at a venture some note at the top of his voice, in the hope that it may prove to be E \flat , though with considerable dread, in the opposite event, of committing a conspicuous *fortissimo* blunder. The essential requisite for a system of musical notation, therefore, is that, whenever it specifies any sound, it shall indicate in a direct and simple manner the relation in which that sound stands to its tonic for the time being. A method by which this criterion is very completely satisfied shall now be briefly described. The old Italian singing masters denoted the seven notes of the major scale, reckoned from the key note upward, by the syllables *do, re, mi, fa, sol, la, si*. As long as a melody moves only in the major mode, without modulation, it clearly admits of being written down, as far as relations of pitch only are concerned, by the use of these syllables. The opening phrase of 'Rule Britannia,' for instance, would stand thus: *do, do, do, re, mi, fa, sol, do, re, re, mi, fa, mi*. In order to abridge the notation, we may indicate each syllable by its initial consonant. The ambiguity which would thus arise between *sol* and *si* is got rid of by altering the latter syllable into *ti*. In order to distinguish a note from those of the same name in the adjacent octaves above and below it, an accent is added, either above or below the corresponding initial. Thus *d'* is an octave above *d*; *d_i* an octave below *d*. When a modulation (*i. e.*, a change of tonic) occurs, it is shown in the following manner: A note necessarily stands in a twofold relation to the outgoing and incoming tonic. The interval it forms with the new tonic is different from that which it formed with the old one. Each of these intervals can be denoted by a suitable syllable initial, and the displacement of one of these initials by the other represents in the aptest manner the supersession of the old by the new tonic. The old initial is written above and to the left of the new one. Thus *rf* indicates that the note *re* is to be sung, but its name changed to *fa*. As this is a somewhat difficult point, a few modulations are appended, expressed both in the established notation and in that now under consideration. The instances selected are from C to G, from C to F, from E to C, from G to F \sharp .





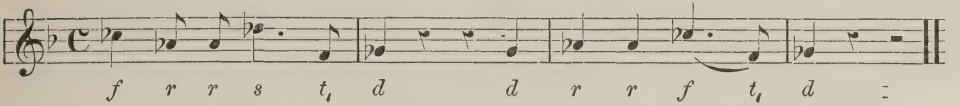
Immediately after a modulation, the ordinary syllable initials come into use again, and continue to be employed until a fresh modulation occurs. It will be seen at once that the difficulty of 'remote keys,' which is so serious in

the established notation, thus altogether disappears. For instance, a vocal phrase occurring in Spohr's 'Last Judgment,' which in the established notation is represented in the following manner:



takes, in the notation before us, the simple form,
s l t | d' m f s | s f l l l s | f m.

As another example, take the following, from the same work:



The system of notation of which a cursory sketch has just been given originated, it is said, with two Norwich ladies named Glover, but has received its present form at the hands of Mr. J. Curwen, to whom it owes the name of 'tonic sol-fa,' by which it is now so widely known. No mention has been made of the notation for minor and chromatic intervals, nor of that for denoting the relations of time by measures appealing directly to the eye, instead of by mere symbols. On these and all other points connected with his system, Mr. Curwen's published works on tonic sol-fa give full and thoroughly lucid and intelligible explanations. Mr. Curwen has also created a very extensive literature of the best vocal music, printed in his own notation, which has given a most remarkable impulse to choral singing." Helmholtz gives his opinion in favor of the tonic sol-fa method.—Melody is a sequence of sounds of different heights and durations, producing an agreeable effect. In the development of music, melody preceded harmony; and Helmholtz traces the progress of musical theory through three distinct periods, viz.: 1, homophonous music of antiquity, to which belongs the music at present in use among oriental people; 2, polyphonic music of the middle ages, which allows of several parts, but without attaching any importance to the individual signification of musical accords; its period extends from the 10th to the 17th century, when it developed into: 3, harmonic or modern music, characterized by the importance given to harmony considered in itself. This school of music began to develop in the 16th century. The best theory of melody, like that of harmony, is based on the existence of the harmonics in all musical sounds. The harmonics which exist in any two sounds determine the affinity of their sequence, just as the affinities existing between the notes of any chord depend

on the harmonics which are common to them. It is necessary for the existence of a melody that the sounds composing it shall have definite intervals between them, or, in other words, steps in pitch, and that these sounds shall have definite durations. The measure of the music directs us in the division of time, while the sequence of the notes by definite numbers of tones and semitones gives us the means of making the steps in pitch; and thus we have the movement of the music from the rhythm and the melody. Such sounds as that made by the wind produce confused and unmusical impressions because of the absence of measure and of gradations in pitch; but music has a scale for measuring the ascending and descending movements of sounds, and this scale is the gamut. The foregoing considerations will lead to a rational explanation why, in the musical scale, we have the octave, the fifth, the third, and so on. In the following table are given the tonic, and under it various musical intervals. Each interval is followed by those of its harmonics which it has in common with the tonic. The greater the number of such ties, the greater the affinity of the notes.

Tonic (1)	1	2	3	4	5	6	7	8	9
Octave (2)	—	2	—	4	—	6	—	8	—
Twelfth (3)	—	—	3	—	—	6	—	—	9
Fifth ($\frac{3}{2}$)	—	—	3	—	—	6	—	—	9
Fourth ($\frac{4}{3}$)	—	—	—	4	—	—	—	8	—
Major third ($\frac{4}{3}$)	—	—	—	—	5	—	—	—	—
Minor third ($\frac{5}{4}$)	—	—	—	—	—	6	—	—	—

The octave has all of its even harmonics in common with the tonic; therefore the affinity between it and the tonic is greater than that between the notes forming any other interval. Hence, the octave is to a great extent the repetition of the tonic, and this is of course true of all the notes of any octave, referred to the

same notes in the octave below. Thus we have a rational explanation of the fact that each succeeding octave repeats the impression made by the one which preceded it. The fundamental tone of the twelfth is really the third harmonic of the tonic, and its second and third harmonics coincide with the sixth and ninth harmonics of the tonic; but the affinity between the tonic and its twelfth is evidently far less than that existing between the tonic and its octave. In diminishing degrees of affinity follow the fifth, fourth, major third, and minor third. The nearest affinities dominated in the earlier periods of music. Thus, in the polyphonic chanting of the middle ages the fifths were most in vogue, while the thirds and sixths are typical of modern music, and are characteristic of the early developments of harmony. According to Helmholtz, there is an affinity of the first degree between two sounds when they have at least one harmonic in common; an affinity of the second degree when the two sounds have a harmonic in common with a third sound. From these premises he deduces the construction of the diatonic scale with notes which have for the tonic affinities of the first and second degrees. The immediate affinities of the tonic C are composed of the notes C₂, G, F, A, E, and E_b, if we confine ourselves to the first six harmonics, the others being too feeble to determine an affinity. We thus have the gamuts: C _ _ E _ F _ G _ A _ _ C₂; or better, C _ _ E_b _ F _ G _ A _ _ C₂, for we cannot place in the same gamut notes so near to each other as E and E_b. In this series there are two intervals which are too large, and in order to divide them we must recur to the affinities of G, which are C, D, E_b, B, C₂. The D and the B are thus found to be related to C by an affinity of the second degree; on interpolating them in the above gamuts, we obtain the diatonic gamut C, D, E, F, G, A, B, C₂; which becomes the minor ascending gamut if we place E_b in the place of E. The D which we find in the affinity of F differs by a comma from D as determined by G. These examples will serve to show the method followed by Helmholtz. "In studying the rules of harmony we finally perceive that the accords, considered as complex sounds, contain the same relations of affinity as the notes of the gamut, by reason of the coincidence of some of their notes. The important function of the tonic in modern music, or what M. Fétis calls the principle of tonality, is also explained by the properties of the harmonics of the tonic. These principles, so clear and so simple, have afforded Helmholtz the means of deducing from considerations in some respects mathematical the fundamental rules of musical composition. Nevertheless, we cannot but be of the opinion that the last word on the theory of music has not been said, for all of the deductions of Helmholtz are not beyond criticism. Thus, Arthur von Oettingen has criticised with much reason the explanation which Helmholtz gives of the difference be-

tween the major and minor modes, for the phenomenon of the harmonics is sometimes barely perceptible. Von Oettingen finds that difference in the reciprocal principles of tonicity and of phonicity. The tonicity of an interval or of an accord consists in the possibility of considering it as a group of harmonics of the same fundamental sound. It is thus that the major accord is formed by the fourth, fifth, and sixth harmonics of the tonic or fundamental. 1. Phonicity is the inverse property of having a harmonic in common; the minor accord $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$ has the sound 1 as common harmonic or phonic. The major accord has the phonic 60; the minor accord has for tonic $\frac{1}{60}$. These relations can be expressed as follows:

$\frac{1}{60}$	$\frac{1}{3} - \frac{1}{4} - \frac{1}{6}$	1	4 - 5 - 6	60
Tonic.	Accord (minor).	Phonic.	Tonic.	Accord (major).
F	A - C - E	E	C	C - E - G
				B

Musicians call C the tonic and G the dominant of the gamut of C major, which can be written thus:

C	D	E	F	G	A	B	C
1	$\frac{3}{2}$	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{3}{2}$	$\frac{5}{3}$	$\frac{15}{8}$	2

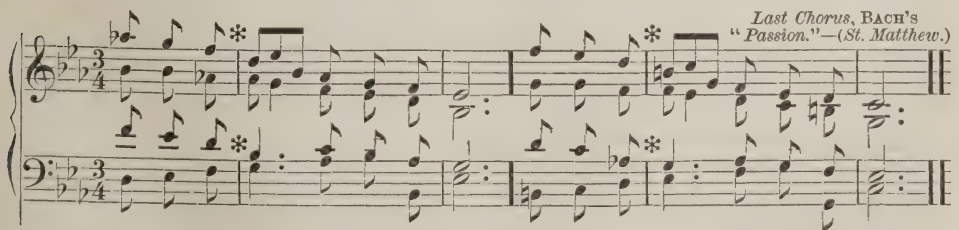
Von Oettingen calls E the phonic and A the dominant of A minor, and writes the above gamut as follows:

E	F	G	A	B	C	D	E
$\frac{1}{2}$	$\frac{15}{16}$	$\frac{3}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{8}{9}$	1

By the development of this dualism he obtains the parallel construction of the major and minor modes." (Radan, *Acoustique*).—Whenever music is written for parts, the laws of harmony necessarily come into play, and the skill of the composer is required, not only to have the harmonics correct, but that the parts shall be distinct and clear. This polyphonic style requires very intricate laws, and hence persons capable of creating lovely melodies, and writing them in combination with other themes, are as rare as great poets. In harmonious treatment of music, the following are a few of the radical laws. In the regular progression of harmonics the fundamental bass note falls a fifth to whatever note, or rises a fourth to the octave above it; but this law has many exceptions. If in the treble or soprano part the procession of notes is upward, say C D E G, the bass cannot give the same notes, but must use others, such iterations being intolerable to the musical ear. Accordingly, it is a rule in harmony or part writing that contrary motion is best between the extreme parts; or that when one goes upward the others go downward, and the reverse. The parallel motion, as it is called, is in use between extreme parts, but then the notes must be different. Thirds or sixths move harmoniously together. When the parts are in octaves, the law against identical notes moving up or down together

ceases, for the effect of such unity supersedes harmony for the moment. There are certain keys which have a close alliance to others. Given a certain key or tonic, for example, on which it is proposed to write a piece, say C: the keys having the closest alliance to this are G major, the fourth below; A minor, the third below; F major, the fourth above; and E minor, the third above. Next in order of alliance to C are E major, E flat major, A major, and A flat major. The key of B major is widely dissociated from C; so too B flat major; and F sharp major is a distant musical shore only to be approached in a long musical voyage. D minor and D major in their relations to C can be used but transiently. D flat major can be reached readily through C minor. The passing to a new key without an intermediate chord is called a transition; when one or more chords are used, it is called a modulation. Transitions are among the brilliant effects of modern dramatic music. A great surprise, sudden and violent emotion, warrants a transition, and the change may be further enforced by an explosion of all the orchestral instruments. The transition is marked in proportion as the notes of the scale are changed. A transition from C to G for the purpose named would be timid and feeble; but one from C to A flat or D flat would be effective. In the one case all the notes of the chord of G are found in the scale of C; in the others, two notes are changed; hence the shock.—We close this portion of the article with a few observations on the relations existing between the physical theory of consonance and dissonance and the æsthetics of music. Helmholtz founds his theory of consonance and dissonance on the fact that whenever a dissonance is perceived beats are produced by the constituent sounds of the chord, and that in consonance these beats are few or entirely wanting. On this physical basis the intervals are placed in the following order, according to their degree of freedom from dissonance. The octave stands first, then follow the fifth, the fourth, the major third, the major sixth, the minor third, the minor sixth. This classification, as stated, is based on the decreasing number of beating harmonics in the successive intervals; but it does not necessarily follow that the smoothest

chords will always be those which are musically the most pleasing; for may there not be some other property which gives us greater satisfaction than mere consonance? "Æsthetic considerations come in here, with the same right to be heard as mechanical considerations within their own domain. Now unquestionably the ear's order of merit is not the same as the mechanical order. It places thirds and sixths first, then the fourth and fifth, and the octave last of all. The constant appearance of thirds and sixths in two-part music, compared with the infrequent employment of the remaining concords, leaves no doubt on this point. In fact these intervals have a peculiar richness and permanent charm about them, not possessed by the fourth or fifth to anything like the same extent, and by the octave not at all. The thin effect of the octave undoubtedly depends on the fact that every harmonic of the higher of two musical sounds forming that interval, coincides exactly with a harmonic of the lower sound. Thus no new sound is introduced by the higher note; the quality of that previously heard is merely modified by the alteration of relative intensity among the constituent harmonics. Major and minor thirds bring in a greater variety of pitch in the resultant mass of sound than does the fifth; but this can hardly be said of the major and minor sixths compared with the fourth. On the whole, we are inclined to attribute the predilection of the ear for thirds and sixths, over the other concords, to circumstances connected with its perception of key relations, though we are not able to give a satisfactory account of them. The ear enjoys, in alternation with consonant chords, dissonances of so harsh a description as to be barely endurable when sustained by themselves. This constitutes a marked distinction between it and the other organs of sense. As instances of the kind of discords in which the ear can find delight, take the following. The chord marked * should in each case be played first by itself, and then in the place assigned to it by the composer. The effect of this isolated discord is so intensely harsh that it is at first difficult to understand how any preceding and succeeding concords can make it at all tolerable; yet the sequence, in both phases cited, is beautiful.



Considerations such as those just alleged tend to show that, while physical science is absolutely authoritative in all that relates to

the constitution of musical sounds, and the smoothness of their combinations, the composer's direct perception of what is musi-

cally beautiful must mainly direct him in the employment of his materials."—Besides the authorities previously mentioned, see Fétis, *Traité du contrepoint et de la fugue* (Paris, 1825); Reicha, *Traité de haute composition musicale*, edited by Czerny (4 vols., Vienna, 1834); Cherubini, *Cours de contrepoint et de fugue* (Paris, 1835; translated into English by C. Clarke); Dehn, *Lehre vom Contrapunkt*, &c. (Berlin, 1841); Marx, *Die Lehre von der musikalischen Composition* (4 vols., Leipsic, 1852); Richter, *Lehrbuch der Harmonie* (Leipsic, 6th ed., 1866; translated into English by John P. Morgan, New York, 1867); Ouseley, "Treatise on Harmony" (Oxford, 1868); "Treatise on Counterpoint, Canon, and Fugue" (1869); and Weber, *Allgemeine Musiklehre* (Darmstadt, 1872).—HISTORY OF MUSIC. The history of music is older than that of civilization. The most savage races are found to have some rude musical instruments, sufficient at least to mark certain rhythmical divisions of time and to serve as accompaniment to the dance; those less savage have melodies; while in all recorded instances where nations have advanced from barbarism to civilization music has followed the national growth. Among the oldest nations of whose history we have any knowledge it has been cultivated from time immemorial. The Hindoo, Chinese, and Japanese music is probably what it was thousands of years ago. The Chinese, whose music practically is unpleasant to refined ears, have some sweet-toned instruments, and a notation for the melodies played on them which is sufficiently clear. Their history and fables touching the art antedate by many centuries those of classic nations; in the time of the emperor Hoangti, some centuries before the Christian era, they had discovered that the octave was divisible into 12 semitones. The relations which the Egyptians assigned between the sounds of music and the planets, the signs of the zodiac and the 24 hours, are all found among the Chinese. The two Chinese instruments, the *kin* and the *che*, contain all the elements of whatever scales. Calculations among the Chinese on all combinations of sounds have been carried to a great extent. Kouie, a Chinese musician who lived 1,000 years before the assumed era of Orpheus, said: "When I play upon my *king* the animals range themselves spell-bound before me with melody." Confucius said 100 years before Plato: "Wouldst thou know if a people be well governed, if its manners be good or bad, examine the music it practises." In their system and practice the Chinese detail eight kinds of sound under which all can be classed: metal, stone, silk, bamboo, gourd, earthenware, skins, and wood. This division, according to them, is to be found in nature. The different substances are made into instruments. They are, besides the gong and the bamboo pipes, the *kin*, a body of thin wood curved like the top of a violin to increase resonance, with five strings of silk of different sizes; the *che*, an instrument kindred

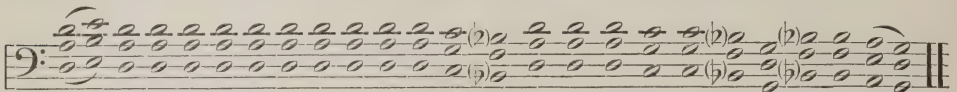
to the *kin*, but having the chromatic or scale of half tones; the *king*, a frame of wood with pendent stone, graduated through 16 notes, and struck with a hammer; drums; a species of flutes, which anciently had but three finger holes; brass instruments of the trumpet species; guitars resembling the mandolin; and little boards with a pleasant sound. The Chinese make use of music in their most dignified ceremonies. The sacred imperial hymn, sung with great pomp annually, is a sequence of long-drawn notes, precisely parallel to the early church music in unison, and lacking the interval of the fourth and seventh, like the old crude popular scales of some European nations. The secular melodies of the Chinese are founded upon sequences of notes, such as are found in playing on the black keys of the pianoforte. They eschew all harmony on principle. Music makes no progress among the Chinese, as their sumptuary laws would restrain its development if there were genius to advance it. The head of the musicians in China is called conservator of the five capital virtues: humanity, justice, politeness, wisdom, and rectitude. Their music affects a certain seriousness, rejecting the sensuous element. The Persians rank vocally among them as the Italians do among us, and it has been said that singers from that country make concert tours in China.—The higher style of oriental music, which has a limited degree of melodious merit, with rhythms logically and distinctly drawn from consociation with poetry as refined and liquid as the Italian, may be found in that of India, dating also from the remotest antiquity. The poetic legends of Hindostan, and indeed of all southern Asia, rival those of China and Greece in ascribing fabulous effects to music. The Hindoos consider every art as a direct revelation from heaven; and while their inferior deities communicated other parts, it was Brahma himself who presented music to mortals. To his son Nared is imputed the invention of the *vin*, a stringed instrument with a finger or key board for frets, being of the same family as the modern guitar. The Hindoo writers on music (and there are works exhibiting earnest study of its mathematical bases) theoretically recognize divisions of the scale corresponding to our octave in 22 fractional tones, these fractions being quarters or thirds, or approximate equivalents. As to the fractions, they admit practically that they have no existence, since only tones or semitones are known in their actual compositions. The succession of tones and semitones in their scale is that of the diatonic. The seven notes of this scale they term *swarras* or sounds, the first or key note being distinguished from all others by this generic word, and the six others by different names. But their words being polysyllabic, the ancient Hindoo artists took their first syllables only to designate respectively the notes of the scale. The syllables thus chosen are quite as good as the Italian *do*, *re*, *mi*, *fa*, *sol*, *la*, *si*, *do*, and are as follows:

sa, ri, ga, ma, pa, dha, ni. These are the notes of the major diatonic scale. The minor mode is also familiar to East Indian music. The finger board of the *vina* is about two feet long, with frets like the guitar, which permit the player to divide the scale into half tones over 14 notes. The Hindoo writers have names corresponding to ours for the tonic or first, the mediant or third, and dominant or fifth of the scale; and indeed there are multitudinous proofs of their assiduous study of the art, however limited their practical skill, owing to the paucity and imperfection of their instruments. They have music in common and triple time, that is, in groups of two and three notes severally.—The Hebrew music, both vocal and instrumental, is constantly referred to in the Bible, and especially in the Psalms, and yet we have no certain knowledge as to its character. It was probably founded on the music of the Egyptians, and it is conjectured that one of the results of the Egyptian training which Moses received was the introduction into the Hebrew service of the music of the Egyptian priesthood. But no melodies that have come down to us can be identified as those used in the temple service. That the singers were a body by themselves under leaders, and that the singing was done by alternate choirs, as was later the case with the primitive Christians, is well known. That they had various instruments, both wind and stringed, is also known. So also had the Egyptians; but as none of the ancient nations possessed a knowledge of harmony, the music they produced must have been to a degree harsh and dissonant. The discovery by Bruce of a painting of a harp upon a Theban tomb furnished the first evidence as to the ancient state of music on the Nile, and of the fact that long before Athens was founded the Egyptians were possessed of stringed instruments. It is further proved from the monuments that the Egyptians had an instrument with frets like the guitar; none of the hundreds of representations of instruments of Grecian music indicate that the Greeks had arrived at that point of ingenuity. What the Egyptian composition of music was can only be inferred, for no relics of it exist, unless the inartificial songs of the boatmen on the Nile be taken as samples of the art of a polished people.—Greek music was probably little more than sonorous declamation, sustained by the lyre, and some pleasant notes from the flute and pandean pipes, with the martial trumpet on occasion. In the Greek drama the language was sung, not spoken. It was a musical recitative, and the chorus intoned. The theatres were very large, without roofs, and were capable of holding many thousands. To enable the performers to be heard well, it was necessary so to intone the voice; and moreover they wore metallic masks to add to the resonance. This was as artificial a mode of representing passion and emotion as the modern opera, though its means were fewer. It is

generally conceded that the Greeks did not understand harmony, and that their lyre of a few strings merely played the notes of the voice. The discovery of some Greek musical manuscripts (that is, poetry with musical signs) on the revival of letters gave rise to great displays of erudition and much passionate argument. Fanaticism in favor of Greek music culminated, but all to no purpose; for no satisfactory key to the Greek system was found. Although a treatise on ancient music by Euclid is extant, and other writers of antiquity who have come down to us discuss it, they shed little light on the ancient musical manuscripts. We know that the Greeks had many hundreds of musical signs; that to be a musician-poet required years of practice; but with the interpretations of the two or three extant Greek musical manuscripts, we can only discover, if the interpretations be right, that they had some sort of minor mode, and declaimed in a kind of recitative, and intoned pretty much as is done in the Roman Catholic service by the priest. The Greek lyre was too poor an instrument to afford much melody, though the ancient flute might have had some advantages; and as there was a theocratic resistance to improvements in instruments, and the maintenance of music in prescribed forms was considered a state necessity, we may fairly infer that the science of music was not understood by the Greeks. Nevertheless their interest in it was great. Musical tournaments were held, and choruses and dances were used to aid the religious ceremonies. Pythagoras and Aristoxenes wrote upon the art, and Boëthius has expounded their theories in five books *De Musica*. With the Romans the art never made any progress, and their music seems to have been an echo of the Greek, without force or originality.—In tracing the history of the art as it exists in our own day, we need go no further back than to the beginning of the Christian era; for although modern music may be said to have a certain relation to that of the ancients, the connection between the two is so slight that it may be disregarded. We look therefore to the early music of the Christian church, to whose fostering influence through several centuries the preservation and progress of the art was due, for the foundation upon which the modern system is built. The exact nature of the psalms used by the early Christians is not known, but they were sung antiphonally, and probably were borrowed partly from Hebrew and partly from pagan sources. The first high ecclesiastic who is known to have greatly interested himself in the music of the church was St. Ambrose, to whom are attributed many of the early hymns and the selection of the four so-called Ambrosian keys or scales in which he advised that the music for the church should be written. The next eminent priest to set his mark upon the music of his time and to further the advancement of the art was Pope Gregory I. (590–604). He

established new ecclesiastical keys, founded and encouraged a system of musical training at Rome, wrote many hymns, and finally was the father of the Gregorian chant, upon the broad foundation of which the music of the church rested for several centuries. But as yet harmony, the most important element of music, did not exist. In chanting, the performers all sang the melody. The system of musical notation was also exceedingly imperfect, certain signs called *numæ* being used to designate the pitch and duration of notes, the lines and spaces of the staff not yet being invented. It was not until the discovery of harmony, and

the invention of the staff and of a proper nomenclature for the notes of the scale, that the art of music began to free itself from its fetters. During the 7th, 8th, and 9th centuries there is little to be recorded in the way of musical progress. At the close of the 9th century Hucbald, a Flemish monk, wrote a treatise on harmony, which had already begun to be practised after a rude fashion, the octave, fourth, and fifth only being used, and the parts progressing together. The following example, harsh enough to modern ears, will serve better than any description to show the condition of the science of harmony in those days:



Nos qui vi-vi-mus be-ne-di-ci-mus Do-mi-num ex hoc nunc et us-que in sæ-cu-lum.

The notation is modern, for it was not till more than a century later that Guido Aretino, also a monk, added two lines to the staff, then consisting of two only, and originated the system of solmization on which his reputation rests. At the same time that progress was made in harmony within the church, the love of music, innate in human nature, found expression through the songs of the people. There is scarcely any nation whose traditions do not furnish examples of folk songs of a remote antiquity. The Celts made great progress in this direction; their bards were famous for their skill in poetry and song. They also possessed an instrument known as the *crouth*, which had several strings of different pitch; and many writers on music have asserted their belief that the secrets of harmony were known to them before they were to the Italians. The French also had their *chansons*, the Italians their *canzonetti*, and the Germans their *Volkstlieder*. Nothing was more common than for the church composers to adopt some well known popular air as a theme for their masses. Indeed, the masses were not infrequently named after the song which served as their basis, so that we find the mass "Farewell, my loves," that of "The Armed Man," that of "The Pale-faced Man," that of "The Red Noses," and many others similarly named. The minstrels, jongleurs, minnesingers, and troubadours played a very important part in the development of the music of the middle ages. From the close of the 11th to the commencement of the 14th century these musicians exercised a wide influence. Minstrelsy and warlike deeds were closely associated; many of the knights were also minstrels. Among those nobles who were distinguished troubadours were Thibaut, king of Navarre, the chevalier Raoul de Coucy, and William IX., count of Poitou. Pierre Vidal of Toulouse accompanied Richard of England as minstrel on the third crusade. The troubadours cultivated various kinds of lyric compositions, such as the *chanson* or love song, the

sirvente or satire, the *tenson* or lyric contest, the *balada* or ballad, and the *serena* or serenade. On their return from the crusades they brought home various new musical forms caught in the East, which served to enlarge the domain of melody. In the beginning of the 14th century the troubadours as a class disappeared; but in that century music received a fresh impetus from the Netherlanders, who suddenly took the lead of all European nations in the cultivation of the art, which supremacy they held for a century and a half, sending their musicians as teachers, leaders, and composers into all countries. The Netherlands at this time were rich and prosperous; their cities were in a condition almost of republican freedom; the government under the house of Burgundy was liberal, and fostered with especial care the arts of painting and music. Counterpoint received great attention during the period of the Dutch supremacy, and in the course of the 15th century the Netherlanders became the most learned contrapuntists in Europe. The first of their composers who came into notice was Guillaume Dufay, born in Hainaut, in the latter part of the 14th century. His masses, which are to be found in manuscript in the papal chapel, are the oldest known in contrapuntal form. Dufay is credited with having emancipated music from the harsh succession of fourths, fifths, octaves, and unisons, which constituted the harmony of preceding composers. The next Flemish composer of eminence was Jan Okeghem, who exerted great influence not only as a composer, but also as a teacher. Among his pupils was Josquin des Prés (died about 1530), the most famous composer of his day. He did not strive, as did many of his time, to construct impossible fugues and ingenious contrapuntal puzzles, written simply to display his technical knowledge, but sought to infuse intelligence and soul into all the parts, and to give sympathy and expression to music. His influence was felt in Italy, where for a time he was attached to the pontifical choir of Sixtus

IV., and in France, where he was composer and chief singer in the chapel of Louis XII. Among his celebrated pupils were Jannequin, Arcadelt and Willaert. With the last named of these composers (died about 1563) the ascendancy of the Dutch in musical composition began to decline. The application of movable metal types to the printing of notes in 1502 served to cheapen and diffuse published music. Willaert's greatest distinction rests on the fact that he was the first celebrated composer who gave his attention to the composition of madrigals, from which fact he was called "the father of the madrigal." While still a young man he went to Venice, and he became the head of the Venetian school. During the 16th century, and contemporary with Willaert, lived many notable composers: in Italy, Palestrina, Constanzo Festa, Luca Marenzio (one of the greatest of madrigalists, surnamed the Sweet Swan), and Cypriano de Rore, called by the Italians il Divino; in the Netherlands, Orlando di Lasso, Clemens non Papa, and Christian and Sebastian Hollander; in Spain, Cristofano Morales; in England, Marbeck, Tallis, Bird, Morley, Weelkes, and Wilbye. Nearly all of these distinguished themselves as composers of madrigals; the English cultivated this form of composition with so much success that the practice of madrigals became during that century the delight of refined society; sight reading was at that time even more than in our own day a common accomplishment among the educated. The madrigals of Wilbye, Weelkes, and Morley have never been surpassed in beauty of melody and form, or in the freedom with which the different parts move. In 1601 Thomas Morley published a collection of madrigals in fulsome praise of Queen Elizabeth, entitled "The Triumphs of Oriana," to which 20 English composers contributed. Of the composers of other nations whom we have named, the two most famous were Palestrina and Orlando di Lasso. The latter was the last of the great Netherlands school, and after his death the ascendancy passed over to the Italians. As to Palestrina, it is difficult to overestimate the talent of the man or his influence over the art in his day. In his compositions the solemn words of the mass found their highest and noblest musical expression. He was truly regarded as the great reformer of church music. So fully was his genius recognized by the composers of his own time, that 14 of the most celebrated combined to compose and dedicate to him a collection of psalms in five parts. He used only the ecclesiastical modes, and avoided all straining after effect by strange harmonies; but his knowledge of counterpoint, and the elevation and nobility of his style, made his masses and his other compositions, of which he wrote a vast number, examples for all time of what true church music should be. During this century the keyed instruments in use were the organ, the virginal, the spinet, the clavichord,

and the harpsichord. The viol, the guitar, and the flute were also used. Between 1550 and 1600 instruments were first introduced into churches for the purpose of accompanying voices. No such thing as independent accompaniment was known at this time, the instruments being used only to reënforce the voice and playing from the vocal score. The violin now began to assume new importance, and in the hands of the Amati family and their immediate successors it was brought with wonderful rapidity to a beauty of form and color and sweetness of tone that have not since been excelled. It is the only example in history of an instrument which at once attained its perfection, and which the inventors of two centuries and a half have not been able to improve upon. (See AMATI.)—The closing year of the 16th century witnessed the birth both of opera and of oratorio. In the year 1600 was performed at Florence a work entitled *Euridice, una tragedia per musica*. The words were by Rinuccini, the music by Peri. This work possessed after a rude fashion the characteristics of the modern opera. In the same year was performed at Rome Emilio del Cavaliere's religious drama *L'Anima è corpo*, which may be considered the forerunner of the oratorio, as Peri's work was of the opera. The way had been long preparing for both opera and oratorio, through the miracle plays and the performances representing the passion of Christ. These sacred musical dramas were often performed in a hall, called by the Italians *oratorio*, adjoining the church, and hence came to be called by that name. Cavaliere's work was first represented on the stage of the church of La Vallicella, with appropriate scenery and action. The personages were Time, Pleasure, the Body, the World, and Human Life. There was also a chorus that commented, after the manner of the Greek tragedies, upon the events narrated. The instruments of accompaniment were placed behind the scenes, and were as follows: *una lira doppia*, a double lyre; *un clavicembalo*, a harpsichord; *un chitarone*, a large guitar; *due flauti*, two flutes. Instead of overture, a madrigal with all the voice parts doubled was recommended by the composer. The example thus set by Cavaliere was speedily followed by other composers. Among the most distinguished of those who contributed to this form of composition during the 17th century were Carissimi, Stradella, Scarlatti, and Caldara. Another element combined with that of the miracle plays to give form to the opera; this was Greek tragedy. With the revival of letters a new impetus had been given, especially in Italy, to the study of the Greek authors. At the house of Giovanni Bardi, count of Vernico, in Florence, a small musical and literary circle was accustomed to meet to discuss the probable forms of Greek music, and the method in which they could be made available. Vincenzo Galilei, father of the astronomer, was one of this number. From theory they advanced to practice,

and Galilei was the first to write music for a single voice. Among the members of this circle were the poet Rinuccini and the musician Peri. Their efforts to reproduce the musical declamation of the Greeks resulted finally in the musical setting to Rinuccini's *Euridice*, in which appeared what they called the *stilo rappresentativo*, which in a somewhat altered form we now know as recitative. The opera of *Euridice* was called by its authors a *drama per musica*, the term opera not being applied to this kind of composition till 1656. The scenery represented first green fields, then the ocean, afterward the abodes of the blest, and finally the torments of the infernal regions. The language was bombastic, and the music awkward and affected. The solos were in the style of recitative, and the choruses in madrigal form. The instruments were the same as those mentioned above in the oratorio. The next Italian operatic composer of eminence was Claudio Monteverde. His *Orfeo*, composed in 1607, was an advance upon Peri's music. The orchestration was better, the recitative more dramatic, and suggestions appeared of the aria, which was yet to be invented. The opera quickly spread over Italy, and finally crossed the Alps, Cardinal Mazarin introducing it in 1645 into France. The first opera there performed was *La finta pazza*, which was given in the presence of Louis XIV. The first French opera was called *Akebar roi de Mogol*; the words and music were by the abbé Mailly, and it was performed in 1646. The first French operatic composer of any note was Cambert, who however was speedily supplanted in the favor of the king by the Italian Lulli. This composer for many years controlled the French lyric stage, more by his sense of dramatic situations than by the merit of his musical forms. He was the first to elaborate and give prominence to the overture. The first of his operas performed in France was *Les fêtes de l'Amour et de Bacchus*, which was represented in 1672. The principal Italian composers during the last half of the 17th century were Cesti, Alessandro Scarlatti, and Carissimi. The last did not write for the stage. Henry Purcell (1658-'95) was at this time one of the few native composers on whom the English could look with pride. He had been a close student, almost an imitator, of the style of Carissimi, and did much, both through his operas and church compositions, for the elevation of his art.—The 18th century was the age of great orchestral writers, operatic and oratorio composers, and performers. It would be impossible to name all of the illustrious musicians of that century; among those of most conspicuous talent were (in the order of their birth) Marcello, Domenico Scarlatti, Rameau, Handel, Bach, Porpora, Hasse, Martini, Pergolesi, Jomelli, Gluck, Piccini, Haydn, Grétry, Paisiello, Clementi, Cimarosa, Mozart, Cherubini, Méhul, Beethoven, and Spontini. Auber, Schubert, Rossini, Meyerbeer, Donizetti, and others, though born in the

18th century, belong rather to the 19th, in which their genius began to manifest itself. We can only refer with any detail to such of those whom we have named as exercised a marked and lasting influence upon the art. First among them was Johann Sebastian Bach. Though he was only cantor at St. Thomas's church in Leipsic, and undertook no works that were not in the simple line of his duty, he has given to the world organ and vocal compositions unrivalled in their way. The art of fugue writing, so steadfastly cultivated during the so-called Dutch period, he perfected. Taking the German chorals for his themes, he wrought upon them his great work, the passion music, the sublimest ever composed for the Protestant church. Though Bach produced also delightful compositions for the stringed orchestra, such as his suite in D, his fame must rest upon his passion music and his organ and pianoforte works. While Bach was elevating the church music of Protestantism, his great contemporary Handel was working out that mighty chain of oratorios that have since been the delight of the world. For many years he had devoted himself to the composition of Italian operas; more than 40 of these exist, but never will be placed upon the stage again. From them, however, have been selected many arias, such as the *Lascia ch'io pianga* from the opera of *Rinaldo*, that are still among the greatest favorites of the concert room. It was fortunate for the world that Handel failed in his operatic enterprises, otherwise such works as "Saul," "Samson," "Judas Maccabæus," "Israel in Egypt," and the "Messiah" would never have existed. In the century and a quarter that has elapsed since they were created, no greater works of their kind have been produced. From Haydn composition for the orchestra received its greatest development. This illustrious composer when a boy had the benefit of instruction from Porpora, the great Italian composer, from whom he derived his knowledge of vocal writing; and he learned the art of setting words to music from Metastasio the poet. But with all these advantages he failed as an operatic composer, while he succeeded in orchestral music and oratorios. His genius for melody was so great that, although he was nearly contemporary with Handel, his melodies are in advance of Handel's in grace, symmetry, and essential beauty. His muse was kindred with Mozart's. In symphonic writing, in many respects, he has not been excelled; in breadth and depth, however, the palm for that department has been awarded to his successor Beethoven. The form of the symphony, as developed by Haydn, is derived from that of the piano sonata or violin quartet; generally it is composed of four movements: an allegro, usually the principal movement; then a slow movement; then a minuet, or old dance tune; then a rondo, or finale, of quick movement. There is no organic completeness in this design, so far as the number of movements is

concerned; they are all distinct, and there might as well be one movement, or 40, if so many could be compassed; but symphonies and quartets were composed according to this method as though under an irrefragable law. Their structure is: a theme or melody in a given key, say C major; a passage leading to another key, G major, the most closely related to the first, with a strong assertion of the chord of the seventh or the fifth of G, which is D, before the second theme or melody is taken; then follows some accessory and climacteric matter, and we arrive at the end of the exposition of the primary ideas. The second part is taken up, generally after the first is repeated, but without stopping; and now begins what is called the development of ideas, in which the primary ones are set off in various ways, by new harmonies or accessories of melody, by double counterpoints (that is to say, placing phrases indifferently as the bass or treble), by modulations, by instrumentation, &c.; and this runs into a repetition of the original melody, to which the second melody is added, but this time in the same key with the original, and the whole is crowned with a musical peroration in which appear the most ambitious flights and climaxes. The second movement of the symphony is a clear melody, with accessory and developed matter, and the melody repeated with a short peroration. The third is a minuet, measured and somewhat developed. In Beethoven's symphonies the minuet is set aside for the *scherzo*, or playful movement, in which piquancy is aimed at. The last movement of the symphony is a melody or theme with accessories, its repetition, and a peroration. Sometimes the last movement is the most important. In the choral symphony of Beethoven the voices are added. The quartets and sonatas of Haydn, as well as those of later composers, are on the same plan as symphonies, but generally briefer, as the variety of instrumental coloring in an orchestra warrants greater length. In the course of 50 years Haydn produced more than 500 instrumental compositions. A remarkable trait of the composer was his unerring sense of orchestral color, and of the precise instrument or combination of instruments that best produced the effects he had in mind. While Haydn was developing the instrumentation of his time, Gluck was working with equal zeal and success in the domain of opera. He was a great reformer, and was the first to announce in clear and unmistakable language the true principles upon which opera should be composed. Much that he then said has since been reiterated by Richard Wagner. Even now the world is slow to accept the theories then advanced; what wonder then that Gluck in his day excited the liveliest antagonism, and that a contention arose between his adherents and those of Piccini (the Gluckists and the Piccinists) which enlisted on one side or the other all the literary and fashionable people of Paris? In the preface to an

edition of three of his operas (Paris, 1769) Gluck expounded his theories of operatic composition, the pith of which is that the legitimate purpose of music is to second poetry in order to strengthen the expression of the sentiments and the interest of the drama, without interrupting the action or weakening it by superfluous embellishments. (See GLUCK, vol. viii., p. 43.) These maxims the composer exemplified by his works. The subjects were mostly from Greek classical literature, as the names of his principal operas indicate, such as "Orpheus," "Alceste," "Iphigenia in Aulis," "Paris and Helen," and "Iphigenia in Tauris." In spite of the fierce opposition of the Piccinifaction, France gave its adherence with enthusiasm to Gluck and his works, and from that day the false and artificial methods of the earlier composers were laid aside, and a new era began for the opera. The dramatic and poetic element found its true position by the side of melody and harmony. The next great composer to exert a wide influence upon operatic and other forms of composition was Mozart. He was a man of universal musical genius, and was distinguished as a writer of chamber music and symphonies and as an operatic composer. His pianoforte compositions were also numerous; but his influence was not marked in that direction, since he adhered to the forms given him by his predecessors, without effecting in them any great change or improvement. To this generation he is best known through his operas. He was a thorough master of the Italian art of singing, and brought to the support of the voice and the enriching of his scores his profound knowledge of treatment. What Gluck had begun in the way of sweeping aside the formalism and artificiality of the earlier Italian operatic composers, Mozart completed. Their works together gave a new direction to art, which has had its effect on all subsequent composers for the lyric stage. While the "Orpheus," "Alceste," and "Iphigenia" of Gluck, and the *Don Giovanni*, "Marriage of Figaro," and "Magic Flute" of Mozart still keep the stage, the works of their contemporaries have mostly passed into oblivion. Cimarosa's *Matrimonio segreto* is still occasionally heard, but we look in vain in the modern operatic *répertoire* for the works of Paisiello, Salieri, Sarti, Paer, Zingarelli, Hasse, or Righini, all prominent composers in Mozart's time. But the 18th century was distinguished also by many illustrious performers. The more extended knowledge of harmony and the constantly increasing technical ability of instrumental players pushed on the musical instrument makers to improvements and new inventions. The violins, violas, violoncellos, and double basses, as we have seen, had already attained their perfection at the hands of the Amati, Stradivarius, the Guarneri, Stainer, and other great makers. Yet much remained to be done for keyed instruments, and the efforts for improvement made in this direction resulted in the

substitution of hammers for the quills that were used in the harpsichord, and the instrument so constructed took the name of forte piano. The invention has been ascribed to several different men, and by some authorities it is carried back to Bartolommeo Cristofali of Padua, harpsichord player to the court of Tuscany. Improvements were made by Schröter of Bohemia, Silbermann of Strasburg, and Stein of Augsburg; but the progress was quite slow. The piano used by Gluck was made by Pohlmann in 1772, and is still in existence. It is a small square instrument, 4½ ft. long and 2 ft. wide, the wires being little more than threads, and so thin that a moderately hard blow would break them. The action is imperfect, and the hammers are a few thicknesses of leather glued over the head of a horizontal jack working on a hinge. John Broadwood and sons became the leading English makers of pianofortes in the latter part of the century, and about the same time the house of Érard was founded in Paris; and Pleyel soon after established himself also in Paris as a pianoforte maker. John Broadwood's first patent bears date July 17, 1773. Among the celebrated performers of this time were Tartini, Farinelli, and Dragonetti.—Among composers born in the last century who came to their maturity and exerted their influence mainly in the present, may be named Cherubini, Beethoven, Spontini, Boieldieu, Hummel, Bishop, Auber, Spohr, Paganini, Weber, Herold, Rossini, Moscheles, Meyerbeer, Schubert, Mercadante, Donizetti, and Halévy. Of the men born within the present century who have distinguished themselves in the art, either as composers or executants, are Bellini, Adam, Berlioz, Herz, Balfe, Mendelssohn, Chopin, Schumann, David, Ole Bull, Thomas, Liszt, Hiller, Thalberg, Wagner, Ernst, Wallace, Verdi, Franz, Bennett, Gade, Gounod, Vieuxtemps, Raff, Rubinstein, and Joachim. Among these Beethoven beyond a doubt occupies the loftiest position in the art; with him instrumental music reached its highest point of development. Whatever form of music he touched he enlarged and ennobled; under his hand the sonata was perfected and the symphony rose to its grandest proportions, culminating in the ninth, concerning which Wagner has said that with it "the last of symphonies had been written and the domain of instrumental music exhausted." His two masses and his single opera *Fidelio* are also among the noblest accomplishments of German art. A few years later than Beethoven, Spontini was born. Among the immediate successors of Mozart he holds an illustrious place. His style was noble and vigorous, his orchestral treatment admirable, and his dramatic instincts correct. In his *Vestale* and *Fernando Cortes* are many passages of true genius. Cherubini may be cited as a composer who particularly linked the styles of the close of the last century with those of this. He produced operas which are still represented, and he was equally

successful in his sublime church music. He competed with Reicha, moreover, in his profound treatises on the fugue. In brilliant fluency Rossini excels all others who have written for the Italian opera; but then it must be remembered that he was preceded by Mozart, whose operas were written to Italian words, and with melodies identical in shape, in caesural pauses, in syllabication, and in relation to the chords, with the Italian school of Paisiello, Piccini, and Cimarosa. Whatever tendency there may have been to avoid excessive ornamentation in singing, and to maintain the theory of Gluck, was set aside for many years by Rossini. Mozart, who indulged occasionally in ultra-florid music, or several notes rapidly sung to a syllable, was not brilliant in that department. Rossini was, and his ornate arabesque work not being of the old pattern, that is to say, merely roulades following a plain melody, but being integrated with the melody itself, he struck the secret of popularity, and swayed Europe musically. The voices, whether bass, tenor, contralto, or soprano, were made to do this ornate work, lavished on serious and comic scenes alike; but with all this profusion of notes, there are ever present touches of severe simplicity. This was exemplified when he wrote for the French Grand Opéra, and produced *Guillaume Tell*. Among Rossini's Italian contemporaries were Bellini and Donizetti. The romantic, tender, and impassioned strains of the former gave a new impulse to the Italian music, and established a greater popularity for it than it had hitherto enjoyed. The directness of his melodies, and his use of a few notes instead of many for masculine voices, enabled amateurs to seize hold of them who were unable to cope with the floridities of Rossini. In this new school Donizetti was the peer of Bellini, and the author of *Lucia* and *Lucrezia Borgia*, with all his shortcomings, has never been surpassed in popularity. It remains only to speak of Verdi, and all the Italian composers of any decided influence in the art will have been referred to. This composer exhibits a perfect apprehension of climax, intuitive knowledge of stage business, and strong dramatic perception. His melodies are clear, strong, and well defined. In his earlier works his merits stood in strong contrast with certain vices of style, such as overstraining the voice for effect, and noisy and empty unison passages. In his later works, such as the *Aida* and the "Requiem Mass," he has profited by the example of more painstaking composers, and produced works more carefully considered and of higher merit than his previous compositions. Many of the operas produced by composers for the French stage combine grace, brilliancy, breadth, and grandeur. Among these the works of Meyerbeer are conspicuous. The *Huguenots* contains some of the finest music ever written for the operatic stage. It has been objected to Meyerbeer that his was too much the music of effect, that he

sacrificed the higher form of art to the spectacle, that years of labor were devoted to the careful study of form, and that the soul escaped; in a word, that while his operas evinced a prodigious talent and industry, the genius was lacking. However this may be, the world has had reason to admire the splendid results of the patient labor which this composer bestowed on his operas. Among the French composers Halévy holds an honorable place. His opera *La Juive*, produced 40 years ago, has maintained its place with undiminished effect, though in his later compositions he was less successful. The most popular of recent French composers are Gounod and Ambroise Thomas. The *Faust* of the former and *Mignon* of the latter are performed wherever French or Italian opera has a foothold. In Germany the modern composers wielding the greatest influence have been Von Weber, Mendelssohn, Schumann, and Wagner. Von Weber, grasping all the extensions and improvements in orchestration, wrote overtures of a larger texture and clearer dramatic form than any predecessor, and infused into his operas qualities which placed him at the head of the new school, the romantic. His vocal writing often wants fluency, though this is less apparent in *Der Freischütz* than in *Euryanthe*; had his metres been better, his music would not have been amenable to this charge. But the transcendentalism of his music was the most daring ever attempted. In a certain class of passionate expression he was without a rival; certainly no such intense portraiture of womanly love was drawn in music before his *Agatha*. The influence of Mendelssohn was exercised partly through his orchestral works, but mainly through his two great oratorios "St. Paul" and "Elijah." Schumann manifested his strength in the vigor and novel form of his pianoforte works, and in the intensely poetic feeling, the dramatic fervor, and the variety of color of his compositions for orchestra; while Wagner has made his power felt through the earnestness with which he has put forth his ideas in his critical writings and through his great works based upon those ideas. The opposition and discussion that have been aroused by the theories broached by him are far greater even than those that were excited when Gluck propounded somewhat similar ones a century ago. But Wagner has gone much further than Gluck dared in carrying out his ideas. As briefly stated by himself, his objection to previous methods upon which operatic composition has proceeded is this: "The error of opera as a form of art has consisted in the fact that music, which is only a means of expression, has been made the end, while the drama, which is the true end of expression, has been made the means; and thus the actual lyric drama has been made to rest upon the basis of absolute music." If this theory is accepted and acted upon by future composers in the same spirit in which it is carried out by its promulgator,

it will revolutionize the art of operatic composition. Among its immediate consequences is the subordination of the composer to the poet. The drama is the thing first to be considered, the music being only a means through which the emotion excited by the dramatic situation is deepened and intensified. In the opera the aria has always been one of the principal means through which the music found expression; but the aria being a formal thing, constructed according to certain fixed rules and centring attention on itself and its own melodic beauty, this retarded the action and distracted the auditor from the thing sung about to the thing sung. Accordingly, this could find no place under the new theory, and Wagner cast it aside, putting in its place the *melos* or "endless melody," a kind of musical declamation springing naturally out of the sentiment of the words that are being sung. The orchestra also ceases to be a mere instrument of accompaniment, and is made by Wagner to enter into the dramatic situation and express it with every variety of tone and harmonic combination. The operas, or rather musical dramas as Wagner prefers to call them, written upon these theories, he avers should have a poetical basis; and he finds the proper subjects in the myths of his own country, making the *Nibelungenlied* the text of his later works. He has deemed it essential for the true exposition of his ideas that his latest operas should not be brought out in any of the German opera houses, but should have a building constructed expressly with a view to their fit and complete presentation. Such a building is now in course of erection at Baireuth, Bavaria, and there in the spring of 1876 Wagner proposes to put his theories to the final test. The four dramas composing the tetralogy, *Der Ring der Nibelungen*, will there be produced, each on a separate day. They consist of *Das Rheingold*, *Die Walküre*, *Siegfried*, and *Götterdämmerung*. Upon the success or failure of the magnificent and costly experiment there to be made, the future of the opera will in a measure depend. —A very decided influence has been exercised upon the musical art of our own day by the composers for the pianoforte. The extensions and improvements of that instrument, now carried so far as to make it the epitome of the orchestra, have been of great use to composers of every class. Through the grand piano and the organ the intricacies of the science of harmony have been explored, chords analyzed, the relations of keys made clear, and melody developed. About 1840 Thalberg began to write dramatic music for the piano, in which he gave the precise vocal pitch of the airs, and at the same time surrounded and embellished them with an arabesque of brilliant execution. There came Liszt, remarkable as a conductor and composer, but chiefly as a pianist. He carried the difficulties of pianoforte playing to their utmost limit, and placed himself by his astonishing powers at the head of modern pianists.

Chopin was a composer of the greatest sensibility. Using the rhythms and characteristic traits of the music of his native country, he treated his themes with a passionate and dramatic fervor and grace that have made him the poet of the instrument. Rubinstein, Clara Schumann, and Von Bülow are also to be ranked as virtuosos of the first order. The pianists whom we have named have seemingly thoroughly explored the capacities of the pianoforte as it at present exists, both as an instrument of expression and of execution. Every technical difficulty has been presented and every form of sentiment expressed, and in this department of the art at least there would seem to be but slight room for further progress.—See Hawkins, "A General History of the Science and Practice of Music" (5 vols. 4to, London, 1776; new ed., 2 vols. 4to, 1853); Burney's "General History of Music from the Earliest Ages to the present Period" (4 vols. 4to, London, 1776-'89); Forkel, *Allgemeine Geschichte der Musik* (2 vols., Leipsic, 1788); Hullah, "History of Modern Music" (London, 1862); Fétis, *Histoire générale de la musique depuis les temps les plus anciens jusqu'à nos jours* (4 vols., Paris, unfinished); Ritter, "History of Music, in the Form of Lectures" (2 vols., Boston, 1871-'4); and Chappell, "The History of Music" (4 vols., London, 1874 *et seq.*).

MUSICAL BOX, a case enclosing mechanism so constructed as to play tunes automatically. The principle of the mechanism is the same as that of the barrel or hand organ, and of the machinery which is used for the chimes of bells in church towers. The use of machines for making mechanical music is almost coeval with the invention of clocks; but musical boxes proper were not introduced much before the latter half of the 18th century. Among the earliest made were small ones to be worn as a charm or seal, pendent from the watch chain; and from this insignificant beginning has grown the modern musical box, capable of almost every musical effect and of playing from one to more than 100 tunes. The principal parts of the mechanism are the comb, the cylinder, and the fly or regulator. The comb is a steel board with many tongues, arranged like the teeth of a comb. The cylinder, which is usually brass, is fitted with small steel pins or points, representing the notes of the tune to be played. This is moved forward or backward by mechanism into a proper position to act on the comb, when it revolves and its pins raise and let fall the teeth, producing musical tones. As the notes must necessarily follow in rapid succession, it is impossible to make one tooth of the comb produce the requisite number without striking on the following pin; therefore, when needed, there are two, three, or four teeth of the comb of the same tone or pitch placed beside each other, which are struck by pins arranged side by side instead of behind each other, thus permitting the rapid recurrence of the same note. The time in which

the cylinder makes its revolutions depends upon the train of wheels and pinions leading to the fly. In all the larger music boxes the fly or regulator is adjustable, the wings which impinge against the air being capable of limited extension and contraction, thus retarding or accelerating the rate of revolution of the cylinder. The tones of the tongues are regulated by their length and thickness; the shorter they are, the quicker are the vibrations and the higher in the scale is the pitch. The vibrations of the long teeth are retarded by masses of lead attached to them, and underneath them are placed little dampers made of spring wire for the purpose of checking the vibrations when too long. Various attachments or accompaniments, such as bells, drums, and castanets, are often applied to musical boxes, and different effects are produced according to the arrangement of the music. In respect to these effects musical boxes are called mandolines, espressives, quatuors, organocleides, piccolos, &c. Some have a combination of reeds and pipes, and are called flutes, celestial voices, or harmoniphones. The musical clocks of the Black Forest, and the musical boxes of Prague and of Ste. Susanne in France, are largely exported. The centres of the manufacture, in its present state of mechanical perfection, are Geneva and Ste. Croix, in the Pays de Vaud, Switzerland.

MUSIMON. See SHEEP.

MUSK, a concretionary substance of peculiar and most powerful odor, which is secreted in a projecting hairy sac or bag between the umbilicus and the prepuce of the male of a small Asiatic animal, called the musk deer, and named by Linnaeus *moschus moschiferus*. The sac is from 2 to 3 in. long, and contains two or three drachms of musk, which when first removed is soft and almost liquid, but afterward hardens and dries into a substance resembling dark-colored snuff, coarsely granulated. The hunters cut off, tie up, and dry the sac, or, as it is called in commerce, the pod; and in this state the article is transported. In China, where it is chiefly supplied to commerce, the pods are packed for shipment in catty boxes holding from 20 to 25 each. A single pod being worth from \$15 to \$18, the adulteration of the article is a profitable operation; and the Chinese practise it with great skill, and to such an extent that genuine musk is scarcely known in trade. Dried blood, having the appearance of musk, is introduced into artificial sacs made of the skin of the animal, and a variety of other substances are added, with which enough musk is intermixed to give its strong odor to the mass. Musk of different qualities is also mixed together by the Chinese with the intention of passing off the whole as the best. That of Tonquin, which is obtained only from China, is far stronger than that of southern Siberia, which is also carried to China as well as to Russia. The Siberian article is received to some extent through Europe. The pods are larger and more elongated than the Chinese, and the musk is in finer

grains, and possesses a fetid odor; while the Chinese is very strongly scented, and has an odor somewhat ammoniacal. A variety exported from Calcutta, where it is brought from Thibet and the Himalaya mountains, is esteemed better than the Siberian, but inferior to the Chinese.—Musk is familiarly known as a perfume of most penetrating and lasting odor. According to the accounts of Tavernier, Charadin, and other travellers in Asia, it is so powerful when first taken from the animal that those exposed to its influence are in danger of hæmorrhage from the nostrils, even when the nose and mouth are protected by coverings of linen. Headache is often produced by approaching the sacs even in the open air. The substance was formerly in high repute as a medicine, and is still largely used by eastern nations and to some extent in civilized countries, being administered in the form of a pill or emulsion. It is used as a stimulant and antispasmodic, and has been employed in hysterical and other convulsions, hicough, and low forms of fever. Its price, the uncertainty of its composition, and a want of confidence in the efficiency of its action, render it by no means a popular drug with American practitioners. Musk is however chiefly of value as a perfume; and it is the most remarkable of substances for the diffusiveness and permanence of its odor. A whole room has been known to be perfumed with it for 30 years, and no perceptible loss of weight in the musk was occasioned thereby; and specimens known to be 100 years old were as strong as the fresh article. One part communicates its smell to more than 3,000 parts of inodorous powder. Its taste is disagreeably bitter and acrid. Its chemical composition is variable and exceedingly complicated. A volatile compound, probably of ammonia and a volatile oil, has been found by Guibert and Blondeau, in the proportion of 47 per cent. Besides this, they separated a large number of other ingredients.

MUSK DEER (*moschida*), a family of small ruminants, living in flocks on the continent of Asia and the larger islands of the Indian archipelago. They have no horns in either sex and no lachrymal sinuses, but the males have two elongated canines in the upper jaw, used as instruments of defence and offence; the legs in some are exceedingly slender; the name is derived from the presence in the males of some of the species of a bag or pouch beneath the abdomen, which secretes the powerfully odoriferous substance known as musk. The true musk deer (*moschus moschiferus*, Linn.) is of about the size of a small roebuck, with shorter legs and thicker body; the color is reddish brown, paler below and on the inside of the limbs, with throat and streak on each side of the neck white, and sometimes whitish gray on the sides; the hair is stiff, long, and curled; the canines project an inch beyond the closed mouth; the hoofs are long and sharp, well adapted for the rocky places in which they de-

light to dwell in the manner of the chamois; the ears are long and the tail short. It is shy, very active, and not easily taken; it is pursued chiefly for the odorous secretion, which is strongest and most abundant during the rutting season. This species is distributed over the



Musk Deer (*Moschus moschiferus*).

mountainous regions of central Asia, especially Thibet and China, extending even into northern Tartary. The flesh is sometimes eaten, and the skins are prepared as articles of clothing and as leather. A species is said to exist near Sierra Leone, on the west coast of Africa.—In tropical Asia and its islands are the allied genera *tragulus* (Briss.) and *meminna* (Gray), containing the most diminutive of ruminants, some of them no larger in the body than a hare. The napu musk deer (*T. javanicus*, Briss.) has shorter ears, smooth hair, very slender legs, with the supplementary hoofs at a greater distance from the ground; like the rest of the genus it has no musk sac; it is about the size of a full-grown hare, of a glossy ferruginous brown color, lighter along the back; throat, chin, under parts, and inside of the limbs white; on the fore part of the chest are three broad, white, radiating stripes, separated anteriorly by bands of blackish brown; and a white line passes back on the cheek from the lower lip. It is commonly called the mouse deer in the straits of Malacca. It inhabits Java and Sumatra, frequenting thickets near the seashore, and feeding principally on berries of a species of *ardisia*; it is easily tamed, when taken young. The kanchil (*T. pygmaeus*, Briss.) is of the size of a small rabbit, of a delicate and elegant shape, and very active; this is the species which is said to leap to the branches of a tree when pursued, hanging suspended by the canines until its enemy has passed by; the flesh is excellent. The color is reddish brown on the back, bay on the sides, white below, with three white streaks under the throat; it is common in the peninsula of Malacca and the neighboring islands, where it is captured in traps or by throwing sticks at the legs when it

comes to feed on the sweet potatoes at night; it is very cunning, feigning death when caught



Kanchil (*Tragulus pygmaeus*).

in a noose.—The Ceylon musk (*meminna Indica*, Gray) is about 17 in. high, an elegant, graceful, and gentle animal, whose flesh is excellent food; the ground color is cinereous olive, spotted, striped, and barred with white; it lives in the jungles of Ceylon and of India.

MUSKEGON, a S. W. county of the S. peninsula of Michigan, bordering on Lake Michigan, and watered by White and Muskegon rivers and other streams; area, about 500 sq. m.; pop. in 1870, 14,894. The surface consists of undulating prairie land; the soil is fertile. It is traversed by the Chicago and Michigan Lake Shore railroad. The chief productions in 1870 were 28,920 bushels of wheat, 28,629 of Indian corn, 24,028 of oats, 72,335 of potatoes, 55,872 lbs. of wool, and 5,658 tons of hay. There were 800 horses, 975 milch cows, 1,037 other cattle, 2,530 sheep, and 1,545 swine; 3 manufacturing of carriages and wagons, 3 of iron castings, 4 of machinery, 3 of sash, doors, and blinds, 5 of tin, copper, and sheet-iron ware, 1 tannery, 1 currying establishment, and 62 saw mills. Capital, Muskegon.

MUSKEGON, a city and the county seat of Muskegon co., Michigan, on Muskegon river, where it expands into a lake of the same name, near its mouth in Lake Michigan, on the Chicago and Michigan Lake Shore railroad, and at the terminus of the Michigan Lake Shore, the Muskegon and Big Rapids, and the Grand River Valley railroads, 90 m. N. W. of Lansing, and 175 m. W. N. W. of Detroit; pop. in 1870, 6,002; in 1874, 8,505. It is a stopping place for the East Shore steamboat line, and has a daily line of steamers to Chicago. The soil in the vicinity is well adapted to fruit growing, and considerable attention has lately been paid to the cultivation of peaches and grapes; but the chief business of the city is the manufacture and shipment of lumber. The logs are floated down the river to the lake, which is 5 m. long and 2 m. wide. The annual shipments amount to about 300,000,000 ft. The

trade employs more than 100 vessels, and large quantities are also shipped by rail. The principal manufacturing establishments are 32 saw mills, two flouring mills, two large steam engine works and foundries, two saw factories, a boiler factory, and five planing mills and sash and blind factories. The city contains two national banks, a union school, five ward schools, three weekly newspapers, and ten churches. Muskegon was first settled in 1836. It was laid out in 1853, incorporated as a village in 1861, and as a city in 1870.

MUSKET, the smooth-bored firearm with which the infantry of all civilized nations has been armed from the beginning of the 18th century until nearly the present time. The best authorities give the derivation of the name from the French *mouchet* or the Latin *musculus*, a male sparrow hawk. This is not so improbable a derivation as would at first sight appear, for other firearms have been named after animals, as for instance the falcon and the dragon; and the probable reason of its use will be found further on. The first portable firearm of which we have any representation is exhibited in a French translation of Quintus Curtius, written in 1468. It was called the bombard or bombardelle, and was a heavy weapon made in the shape of a blunderbuss, and fired from the shoulder, or from a wooden frame or rampart,



FIG. 1.—Bombard.

with a live coal or match. There is some evidence that these weapons were used as early as

1346 by the English at the battle of Crécy, but it is not definite. They were certainly used before the beginning of the 16th century. When gunpowder was first applied to warlike purposes, the cannon were hooped, and externally were not unlike boxes. In Germany they were therefore called *Büchse*, and an artilleryman was a *Büchsenmeister*. When guns were transported on wheels they were called *Kanonbüchse*. The portable arm which followed the bombardelle was called in German *Hakenbüchse*, because it had attached to the forward part of the stock a hook (*Haken*) which received the shock of the recoil. This name was corrupted in other languages to *arquebus*, *arquebuse*, *archibuso*, &c. The arm was also

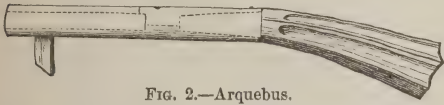


Fig. 2.—Arquebus.

used with a forked stick upon which to rest the forward end in the act of firing, and was, if not the earliest, certainly one of the earliest portable firearms. About the same time the hammer and pan for priming were applied to the arm, and they or their equivalents have been used on portable firearms ever since. When the hammer was first used, it was merely a piece of iron bent in the shape of the letter S, and called the serpent, one end of which carried the live coal or match, and the other acted as a trigger. It was fastened to the piece at its centre, about which it could move; when the piece was to be fired the trigger end was pulled, and the match end was brought down on the priming. Springs were soon attached to it, causing it to go back to its original position after it had done its work; and this arrangement was the first gunlock. Muskets with the serpent attachment were captured from the Chinese at the Peiho forts in 1860,

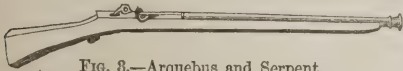


Fig. 3.—Arquebus and Serpent.

and were in use in Japan until within a few years. During the 15th and 16th centuries the use of the arquebus became general in the continental nations of Europe; but the English still retained the crossbow, believing that it was more rapid and accurate in its action, and that its range was greater.—In 1517 the wheel gunlock was invented at Nuremberg, and at this time the portable arm took the name of musket. This lock consisted of a heavy iron plate to which the parts were fastened. The parts were a steel wheel about an inch and a half in diameter and a quarter of an inch thick, the circumference of which was channelled. To the arbor of the wheel was attached one end of a short iron chain, the other end of which was fastened to a heavy spring. By means of

a key, about three fourths of a turn could be given to the wheel, compressing the spring. When the wheel was turned sufficiently, a dog engaged in a corresponding hole in the wheel, fastening it. This dog could be lifted out of its hole by the action of a lever corresponding to the trigger in the modern lock, and when the dog was so lifted the wheel moved round with some rapidity. Above the wheel was fastened the pan, a piece of iron, pan-shaped, in the bottom of which was cut a hole through which a small part of the circumference of the wheel projected, filling the hole. The cock or hammer was a piece of iron or steel so arranged that one of its ends held a flint or piece of iron pyrites between jaws, and the other end was fastened to the lock plate, the hammer being free to move around the fastening. A spring acted upon the fastened end, so that when the flint end of the hammer rested upon that part of the wheel projecting through the pan, the spring pressed it hard on the wheel. To discharge the piece with this lock, suppo-

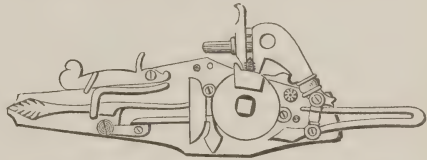


Fig. 4.—Wheel Lock with Serpent attached, front view.

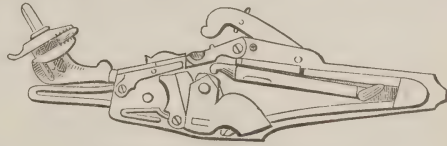


Fig. 4a.—Wheel Lock with Serpent attached, rear view.

sing the priming to be in the pan, the wheel was turned until it engaged the dog; the cock was then turned so that the flint pressed on the wheel; then by pushing the trigger or lever, the wheel turned quickly, and sparks were thrown off, igniting the priming. This was an exceedingly ingenious piece of mechanism, and all flint locks made since its date are modifications of it. Many locks of the present day contain the same ideas in an improved form. The flint was held in the cock or hammer by jaws moved by a screw. In some specimens of this lock these jaws are engraved to represent the head of a bird of prey holding the flint in its beak. It is not unlikely that the name musket originated with this device. So in Germany the hammer is called *Hahn*, cock. In England and the United States cock was the name of the hammer so long as flint locks were used. In France the hammer was called *chien*, dog. As the flint in the wheel lock often missed fire, in some cases the serpent was also attached to one end of the lock plate. In this the match was kept lighted,

so that the musketeer was sure that by some means he could fire his piece. During the 16th century muskets with wheel locks were introduced into all the continental armies, but pikes were also used by foot soldiers, and the proportion of muskets to pikes was about one to three. The musket at that period bore the same relation to the infantry that the field piece does in armies of the present day. It was a good attacking weapon, but in close quarters the brunt of the action was borne by the pikemen, for the musketeers had as much as they could do to take care of their unwieldy weapons. In the 16th century the flint lock as it exists at present was also invented in Spain, and it was merely changed in details of construction, and by some subsidiary inventions, until it was in general superseded by the lock for percussion caps in this century. For a long time the flint lock was regarded with disfavor as too complicated, and likely to fail, and for nearly 100 years its use did not become general. It was adopted in France in 1630. The English were behind continental nations in portable firearms in the 16th and 17th centuries. As late as 1668 "The Compleat Body of the Art Military," by Lieut. Col. Richard Elton, which gives a system of infantry tactics and manuals for the pike and musket, recommends that two thirds of each company shall be armed with the musket and one third with the pike. The musket manual is for the arm with the match lock or serpent, and there is nothing in the book to indicate that its au-

thor had ever heard of the wheel or flint lock. The latter was introduced into England about the year 1690.—The musketeer in the days of matchlocks was a very unwieldy soldier. He

carried his musket and its rest, and a large sword. Over his left shoulder was slung a broad leather belt called a bandolier, the ends of which were fastened on the right side. On this were

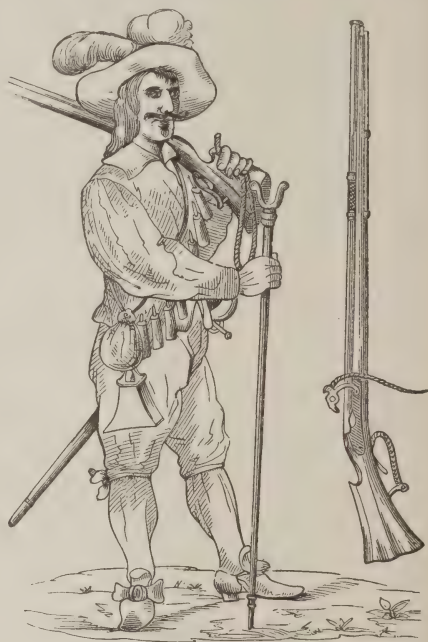


FIG. 6.—Musketeer of 16th and 17th centuries, fully equipped, showing Schweinsfeder and Musket.

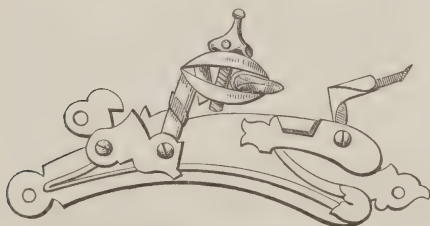


FIG. 5.—Chenapan or Snaphaunce Lock.

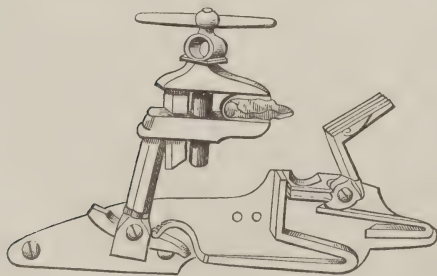


FIG. 5a.—Arab Lock of same construction.

thor had ever heard of the wheel or flint lock. The latter was introduced into England about the year 1690.—The musketeer in the days of matchlocks was a very unwieldy soldier. He

hung a number of wooden, leather, or tin cylinders, each containing a charge of powder for his musket. The balls were contained in a leather bag, and the priming powder in a flask or horn, and both were slung by separate slings from the left shoulder to the right side. He was a man of much greater consideration than is the infantry private soldier of the present day, and in some armies was allowed a servant to carry his musket on the march. At the battle of Wittewiler, in 1638, which lasted eight hours, the musketeers of the duke of Weimar fired seven times only. This account shows that the use of the musket at that time did not add greatly to the destructiveness of wars.—The *Schweinsfeder* (hog's bristle) was the immediate forerunner of the bayonet. It was a long rapier with a thin handle, and its sheath was the musket rest, which was an iron tube forked at the upper end. When the rapier was to be used, the handle was inserted in the muzzle of the musket, which then became an efficient pike. As the arm became lighter, the musket rest gradually went out of use, and in order to keep up the use of the arm as a pike as well as a firearm, some new weapon had to be devised. So in 1640 the bayonet was introduced, taking its name from Bayonne, where it was first made. At first the shank or handle was made of wood, and was inserted in the muz-

zle of the piece. Soon afterward it was made of metal in the shape of a hollow cylinder, and was secured to the piece by slipping the cylinder over the end of the barrel, and fixed

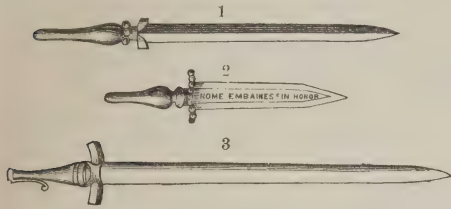


Fig. 7.—First Bayonets. 1. Bayonet of 1640, triangular blade, fastening in bore of musket. 2. Spanish Bayonet, fastening in bore. 3. French Bayonet, fastened by ring and spring.

in place by a stud soldered to the barrel. This arrangement permitted the piece to be fired with the bayonet fixed. The introduction of the bayonet gradually caused the pike to be thrown aside as an infantry weapon, and correspondingly increased the importance of the musket. About this time sights were placed on muskets, and their accuracy of fire was consequently much increased. The flint lock was improved, and the barrel and stock were fastened to each other in a more mechanical manner. Cartridge boxes were introduced, and during the second half of the 17th century the musket was so materially improved that it may be considered as having become the main arm of the infantry from the commencement of the 18th century. The ramrod of the musket, made of wood, was clumsy and easily broken until about 1720-'30, when the iron ramrod was introduced into the Prussian army by Frederick William I., father of Frederick the Great; and the consequent improvement in the rapidity of fire of the musket was enormous. At the battle of Mollwitz, in 1741, between the Austrians and Prussians, the Austrians used wooden and the Prussians iron ramrods. The defeat of the Austrians was at the time imputed

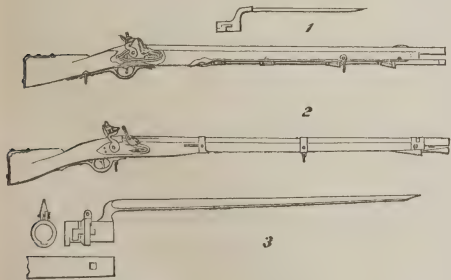


Fig. 8.—1. Old Prussian Musket and Bayonet, with wooden ramrod. 2 and 3. French Musket and Bayonet, model of 1777-1800.

to the superior rapidity of fire of the Prussian muskets, due entirely to the use of iron ramrods. During the remainder of the 18th century the musket gradually, by changes in form,

took on the continent of Europe nearly the shape and appearance that it retained until the superseding of the muzzle-loader by the breech-loader. Bands were substituted for the projections on the barrel which fastened it to the stock, the ramrod was lightened, the leather strap for carrying the arm on the march was added, and the weapon was made simpler and more convenient, so that the soldier was sooner instructed. France led in these improvements. Great Britain seems to have retained an earlier model, and bands were not there applied to muskets until the present century. In the early part of the 19th century, on account of the wars of the French republic and empire, the number of muskets manufactured was enormous. In the two years 1809-'10 Birmingham furnished 575,000 musket barrels and 470,000 gun locks. In 1813 England made 500,000 muskets, and from 1814 to 1816 she furnished for her allies and herself 3,000,000. From 1803 to 1814 there were made in France about 4,000,000 muskets.—In 1818 the percussion cap was invented, and its use gradually superseded

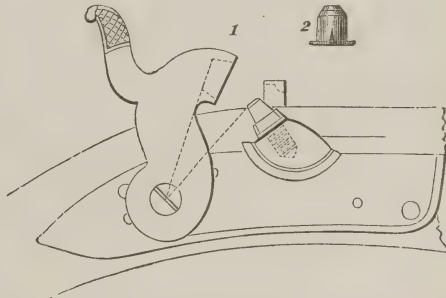


Fig. 9.—1. Percussion Musket Lock. 2. Military Percussion Cap.

that of the flint and steel, so that by 1850 nearly all the armies of the civilized world were armed with muskets using the percussion locks. The advantages of these locks are: 1, the lock is simplified; 2, the operation of firing is shortened; 3, the sureness of fire is increased, the presence of water having no effect upon the explosion of a good percussion cap. The explosive substance in military percussion caps is fulminate of mercury. This salt is mixed with powdered glass, and a small portion of the mixture is placed in the bottom of a copper cup. The fulminate is covered with tin foil, and then with lacquer, so that it is impervious to water. With the percussion lock a "nipple" or cone was fastened to the barrel of the musket at the right side of the breech instead of the pan of the flint lock, and a hole through the cone communicated with the rear of the bore. The percussion cap was placed on the cone, which it fitted closely; the hammer struck the cap, exploded the fulminate, and communicated fire to the gunpowder in the barrel.—The calibres of muskets were until about 1850 .7 in., a little more or less. The

old British musket "Brown Bess" had a bore .75 of an inch in diameter. The length of the barrel was 42 in., the weight of the ball 1.06 oz., and the weight of the musket 12.25 lbs. The whole length, including bayonet, was 59 in. About 1853 in Great Britain the Enfield rifle was adopted, the bore of which was .577 in. Until this time British muskets were made without bands, the barrel being fastened to the stock by pins. The Enfield rifle had bands. The weights of all muskets in use in the last century were from 10½ to 12½ lbs.—In the

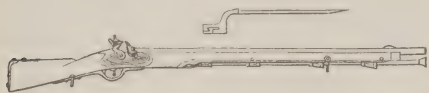


FIG. 10.—English Musket, "Brown Bess."

United States the first muskets used were of course of English manufacture. The Indian and French wars had caused the distribution of large numbers of these arms among the colonies, and the war of the revolution was commenced with them. But after the alliance with France was perfected, French muskets were obtained, and it is likely that by the end of the war, in 1783, the troops were generally armed with French arms. The United States began to manufacture muskets at Springfield, Mass., in 1795, after the French model, and this model with slight variations was used until the adoption of the Springfield rifle, model of 1855. New models were introduced in 1799, 1822, and 1840, all of French style, and of the French calibre, .69 in., and carrying a ball weighing a little less than an ounce.

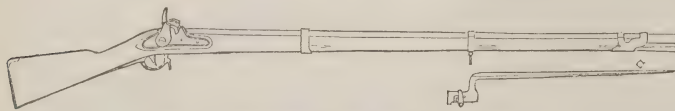


FIG. 11.—Musket and Bayonet, Model of 1841.

In fact it may be said that until the introduction of the needle gun in Prussia, France gave the model for the musket to all civilized nations. About 1842 percussion-lock muskets were adopted, and when the Mexican war began in 1846 there were enough to have armed the troops; but Gen. Scott preferred the flint-lock musket, considering it dangerous to campaign in an enemy's country with so untried a weapon as the percussion musket. After that war its use became general in the army. In 1855 the Springfield rifle was adopted, and it gradually displaced the old musket, until at the commencement of the civil war in 1861 the troops of the regular army were armed with that weapon. Nearly all the infantry arms at that time in store were muskets of .69 in. calibre. The whole number of muskets and rifles manufactured at the Springfield armory from 1795 to 1865, when the manufacture of muzzle-loading arms was stopped, was 1,517,464, and

the expenditure during the same period was \$25,199,626 30. Over \$2,000,000 reckoned as expenditure was the value of the property of the United States in lands, buildings, &c., belonging to the armory, and about \$3,000,000 was the value of the parts of arms unassembled when the manufacture was stopped. The number made at the other United States armory, that at Harper's Ferry, Va., cannot be given. At the commencement of the civil war this armory was dismantled, and all the records and movable property were carried to Richmond by the confederates. Its capacity for turning out arms was then about equal to that of the Springfield armory.—There are other names of muskets besides those given previously. The hand cannon was a tube on a straight piece of wood about 3 ft. long. It had trunnions, cascable, and vent on top like a cannon. Afterward the vent was placed at the side and the priming was held in a pan. Its date was nearly the same as that of the bombardelle. The hand gun was longer in barrel than the hand cannon. It had a cover for the pan, and some arrangement for taking sight. The English seem to have used it in 1446. The snap-haunce was a modification of the wheel lock. Instead of the wheel a straight piece of furrowed steel was used. The flint pressed against it, and when the steel was suddenly moved by the spring, fire was struck. It was introduced into England in Queen Elizabeth's time, but did not get into general use until the time of the civil wars. The name is derived from the Dutch. The caliver, lighter and shorter than the musket, had a match lock. The carbine was simply a horseman's musket, and was shorter

and lighter than the infantry musket. The origin of the word is obscure. It was introduced into England from France, but the term came from Spain, and from Calabria, where it

was first used. It has been surmised that the Calabrians used it on board of small vessels called carabs. The term fusil applied to a musket appears to have been taken from the French, and was brought into England when locks using flints were introduced. It is technically the steel against which the flint is struck in a tinder box or gun lock. The term fusiliers for part of the infantry is still retained in some armies, particularly the British, and was originally the name given to troops using the flint-lock musket, to distinguish them from those who used the match-lock or wheel-lock muskets. The mousquetoon was of French origin, and shorter and not so efficient as the musket. The petronel was a short musket for horsemen's use. The name comes from *pedernal*, flint, and not, as is generally supposed, from *poitrine*, as it was supported against the breast when it was fired. The blunderbuss was a short piece with a large bore and funnel-shaped

muzzle. It was loaded with slugs, nails, &c. The word is of German origin, and the arm was introduced into England from Holland. In German *Donnerbüchse* would be the term, which after corruption by the Dutch becomes blunderbuss in English. The *escopette* is the Spanish or Mexican name (*escopeta*) for a carbine. The oldest document that mentions portable firearms is an inventory at Bologna dated 1397, in which they are called *scolpos*. From this term were derived later *sclopeti*, *esclopette*, *escopette*. (See RIFLE.)

MUSKINGUM, a river of Ohio, formed by the junction of the Walhonding and Tuscarawas, which rise in the N. part of the state and unite at Coshocton, whence it flows S. E. for about 110 m. through Muskingum, Morgan, and Washington counties, and enters the Ohio river at Marietta, its mouth being 225 yards wide. At Zanesville and other points abundant water power is afforded by falls. It is navigable for steamboats to Dresden, 95 m. from its mouth.

MUSKINGUM, a S. E. county of Ohio, intersected by the Muskingum river, which affords abundant water power, and drained by Licking river and other branches; area, 665 sq. m.; pop. in 1870, 44,886. It has a diversified surface and fertile soil, and contains bituminous coal, iron ore, and salt, the last procured by deep boring into the whitish sandstone, or salt rock. Large quantities of salt and coal are exported. It is intersected by the Ohio canal and the Central Ohio division of the Baltimore and Ohio railroad. The Muskingum Valley railroad terminates at Zanesville, and the Pittsburgh, Cincinnati, and St. Louis passes through the N. W. corner; there is also a branch from Dresden to Zanesville. The chief productions in 1870 were 336,984 bushels of wheat, 1,198,677 of Indian corn, 313,240 of oats, 185,130 of potatoes, 605,194 lbs. of wool, 815,562 of butter, and 38,094 tons of hay. There were 9,430 horses, 9,379 milch cows, 15,480 other cattle, 145,954 sheep, and 21,690 swine; 5 manufactories of agricultural implements, 8 of brick, 19 of carriages and wagons, 1 of railroad cars, 3 of woollen and 1 of cotton goods, 4 of furniture, 3 of glass ware, 2 of iron, 7 of castings, 11 of saddlery and harness, 8 of salt, 31 of stone and earthen ware, 18 tanneries, 5 breweries, 13 flour mills, 5 saw mills, and 2 lime kilns. Capital, Zanesville.

MUSKOKEES. See CREEKS.

MUSKOKA, an electoral district of Ontario, Canada, in the W. part of the province, bounded W. by Georgian bay; area, 5,307 sq. m.; pop. in 1871, 6,919, of whom 2,541 were of English, 2,092 of Irish, and 1,293 of Scotch origin or descent. It is bounded S. by the Severn river, and watered by Muskoka river, by the outlet of Lake Nipissing, and by other streams and lakes. Capital, Bracebridge.

MUSK OX (*Ovibos moschatus*, De Blainv.), a ruminating animal found in the arctic regions of America, seeming to form, as its generic name imports, the connecting link between

the ox and the sheep. It is about the size of a two-year-old cow, 5½ ft. from nose to root of tail, and weighs about 700 lbs., two or three times as much as the reindeer; the head is large, and surmounted by broad flat horns in both sexes; in the males the horns



Musk Ox (*Ovibos moschatus*).

meet on the median line of the head, from which they bend down on the cheeks, and then turn outward and upward, much as in the gnu; dull white and rough on the basal half, they are smooth and shining beyond, and black at the point; the horns of an old male measured by Dr. Kane were 2½ ft. from tip to tip, and each 1½ ft. to the median line of the head. The nose is very obtuse, with only the small space between the nostrils naked; the ears not perceptible, tail concealed by the hair, the legs short, and the hoofs broad and inflexed at the tips. The hair is so long that it almost reaches the ground, so that the animal looks more like a large sheep or goat than an ox; the color is brownish black, more or less grizzled. The musk ox frequents arctic America from lat. 60° to 79° N., and from lon. 67° 30' W. to the Pacific coast; though Dr. Kane saw no living specimens, the skeletons and probably footmarks were so numerous that he was inclined to believe the statement of the Esquimaux that these animals had been recent visitors, and probably migrated from America to Greenland; they are generally seen in herds of 20 or 30, in rocky barren lands, and feed on grass and lichens; the rutting season is about the end of August, and the young are born toward the first of June. Though the legs are short, they run very fast, and climb hills and rocks with great facility; they are difficult to approach; the males are irascible, and often dangerous when slightly wounded; the flesh, when fat, is well tasted, but when lean smells strongly of musk, as does the whole animal, whence its name; the hair is long and fine, and, if it could be obtained in sufficient quantity, would be useful in the arts; the skin is made into articles of dress by the Esquimaux. The tracks made by this animal in the snow are much like those of the reindeer, somewhat larger, and

can be distinguished only by the skilful hunter. Only one living species is known, and the geographical distribution of this is not precisely ascertained. It is very rare in collections, the only specimen in the United States being in the museum of the Philadelphia academy of natural sciences, a stuffed skin presented by Dr. Kane. It is said to occur fossil at Eschscholtz bay on the N. W. coast. The *bos Palasii* (De Kay) of North America and the fossil oxen found in various parts of the United States, coming near the musk ox, have been described by Dr. Leidy, under the name of *bootherium*, in vol. v. of the "Smithsonian Contributions to Knowledge" (1853), as the *B. cavifrons* and *B. bombifrons*; these probably, he says, were clothed in a long fleece, and inhabited the great valley of the Mississippi just anterior to the drift period. The Siberian and northern European fossils probably belong to the genus *ovibos*.

MUSKRAT (*Fiber zibethicus*, Cuv.), an American rodent, the only species of its genus, well known for its aquatic habits; it is also called musquash, musk beaver, and ondatra. The dentition is: incisors $\frac{2}{2}$, and molars $\frac{3}{3}$ - $\frac{3}{3}$, in all 16 teeth. The body is rat-like, the head and neck short; the eyes and ears very small, the latter having no special arrangement except their dense fur to exclude the water; the upper lip not cleft, and hairy between the teeth and nose; lips thick and fleshy; nose thick and obtuse; six horizontal rows of whiskers, with some over the eye and under the chin; the legs short, and the thighs hid in the body; the claws compressed and incurved, the third toe the longest on the fore feet and the fourth on the hind feet; the hind feet appear slightly twisted, the inner edge posterior to the outer, by which the animal can "feather the oar" when the foot is brought forward in swimming; all the feet are partly webbed, naked below, covered with short hairs above, and



Muskrat (*Fiber zibethicus*).

have their edges more or less margined with bristly fringes; the tail is two thirds as long as the body, compressed, two-edged at the end, scaly, with short thin hair; the fore feet are four-toed, with a wart-like thumb, and the hind feet five-toed. The head and body are

from 13 to 15 in. long, and the tail 9 or 10 in.; the general color is ruddy brown above, darker on the back, and cinereous beneath; some specimens are very dark brown; the long hair is fine, compact, and silky, with coarser hairs intermingled, especially above. It is more extensively distributed over North America than the beaver, and unlike the latter does not disappear at the approach of civilization; it is found from the Atlantic to the Pacific, and from the Rio Grande to arctic America, even on the N. W. coast; it occurs nowhere in the old world. Fortunately for the rice planter, it is not found in the alluvial lands of the Carolinas, Georgia, Alabama, and Florida, though it extends much further south. Its favorite locality is a grassy marsh or bank of a lake or sluggish stream; nocturnal in habit, it is occasionally seen in the daytime swimming a stream or diving into the mouth of its hole; awkward on land, it is an excellent swimmer and diver, and very lively and playful in the water; it often swims 15 or 20 yards under water. The burrows are made in banks skirting streams, the entrances being under water, thence leading upward above the highest freshets; their winter galleries often extend 40 or 50 ft. from the water, the central part containing the nests, made of dried reeds and grasses; in swamps and marshy lands they sometimes raise mounds of sticks, twigs, and leaves from 2 to 4 ft. above the surface, in which are their grassy beds large enough to accommodate several animals; the entrance to these is also under water, the surface of which they take care shall not be entirely frozen. The fur was once in great demand for hats, and hundreds of thousands of skins were annually exported for this purpose to Europe; their value is now very small, as they are used chiefly for cheap furs; the animal, however, is generally killed when possible, to prevent the destruction of dams and embankments. They are not at all cunning, and may be caught in ordinary box traps, or in steel traps placed just under water and baited with sweet apples or parsnips; they are often dug out of their holes, hunted by dogs, and speared in their nests. Great numbers are killed by lynxes, foxes, owls, and other rapacious mammals and birds. Like the common rat, they are omnivorous, feeding on grasses, roots, vegetables, mussels and other mollusks, fruits, and even flesh; they are injurious rather from digging under embankments and undermining meadows than from destroying vegetation either in field or garden. They are very prolific, bringing forth four to six young at a time, three times a year. They have a strong musky odor, which to most persons is less offensive than that of the mink, and far less so than that of the skunk; the flesh is considered palatable in some localities.

MUSK TURTLE. See TORTOISE.

MUSONIOUS, *Calus Rufus*, a Roman stoic of the 1st century A. D. Nero banished him to Gyarus in 66, under pretence of his having been

a party to the conspiracy of Piso. On the death of Nero he returned from exile, and when Antonius Primus, the general of Vespasian, was advancing against Rome, he joined the embassy sent by Vitellius to make terms with his enemies. After the downfall of Vitellius he became reconciled to Vespasian, who suffered him to remain in Rome. The only edition of the extant fragments of his works is that of Peerlkamp (Haarlem, 1822).

MUSPRATT, James Sheridan, a British chemist, born in Dublin, March 8, 1821, died in Liverpool in November, 1871. He removed at an early age to Liverpool, where his father established a large chemical manufactory. At the age of 13 he travelled through France and Germany, and subsequently studied in the laboratory of Prof. Graham of Glasgow, whom he accompanied to London. Before reaching the age of 17 he was sufficiently advanced to be intrusted with the chemical department in a large manufacturing establishment in Manchester, and he also published a lecture on chloride of lime. After an attempt to embark in business in America, by which he lost money, he went in 1843 to Giessen and studied chemistry for two years under Liebig. His first important original paper was one on the sulphites, published in Liebig and Wöhler's *Annalen*, in which he proved the analogy between the sulphites and the carbonates, and which procured him the degree of doctor of philosophy. While at Giessen he edited Plattner's "Treatise on the Blowpipe," with many valuable additions. Between 1845 and 1847 he travelled over Europe, returning in the latter year to Giessen, where he discovered several remarkable bodies produced from the sulphy-cyanides of ethyle and methyle. In 1848 he returned to England, married the American actress Susan Cushman, and soon after founded a college of chemistry in Liverpool, of which he was appointed director. In 1854 he commenced a dictionary of chemistry, published in Europe and America in parts, which was completed in 1860 in 2 vols. royal 8vo. It was translated into German and French, and reached a large circulation. He has also published "Outlines of Quantitative Analysis for Students."

MUSQUASH. See MUSKEAT.

MUSCHENBROEK, Pieter van, a Dutch mathematician, born in Leyden, March 14, 1692, died there, Sept. 19, 1761. He was educated at Leyden, and in 1717 formed an intimacy with 'sGravesande, who subsequently coöperated with him in introducing the Newtonian system of philosophy into Holland. In 1718 he took his degree of doctor of medicine, and soon afterward visited England for the purpose of seeing Newton and making himself acquainted with his system. In 1719 he was appointed professor of philosophy and mathematics and professor extraordinary of medicine in the university of Duisburg, which he resigned in 1723 for the chair of philosophy and mathematics at Utrecht. Here he re-

mained till 1739, and about 1740 he accepted the chair of mathematics at Leyden, which he filled during the remainder of his life. His works contain many original researches in experimental physics, and are among the earliest expositions of the Newtonian philosophy; the cohesion of bodies, the phosphorescent properties which many bodies acquire from exposure to light, magnetism, capillary attraction, and the size of the earth being among the subjects most successfully treated.

MUSSEL, or **MUSCLE** (Lat. *musculus*; Ger. *Muschel*), a well known lamellibranchiate mollusk of the genus *mytilus* (Linn.). It belongs to the dimyarian group, or those having two adductor muscles, the anterior being small; the mantle has a distinct anal orifice; the foot is small, cylindrical, grooved, with many retractile muscles and a large silky byssus divided to its base; the shell is longitudinal and subtriangular, with the beaks terminal and pointed, dark-colored and shining. The common salt-water mussel (*M. edulis*, Linn.) is from 1 to 2½ in. long and 1 in. broad, of a greenish black



Common Salt-water Mussel (*Mytilus edulis*).

color externally and purplish and bluish white within. This species is esteemed as food in Europe; they lie together in large beds uncovered at low water, and are more easily obtained than the oyster; they are most esteemed in autumn, as in the spring or spawning season they are apt to disarrange delicate stomachs and to produce a cutaneous eruption; thousands of bushels are annually obtained for food and bait for deep-sea fisheries, affording employment for hundreds of women and children, especially along the frith of Forth; they anchor themselves very firmly to rocks and stones by the horny threads of the byssus, directed by means of the foot, and attached by their broad disk-shaped extremities. The common mussel of New England (*M. borealis*, Lam.), by some considered the same as the last species, is eaten, fresh and pickled, in some parts of the country, but is more commonly used for bait or manure. The forms of their shells are very various, from accidental distortions or from the shape of the cavities and crevices in which they are commonly wedged. Several other species are described.—Another shell, commonly called mussel by the fishermen, is the allied genus *modiola* (Lam.), known in Europe as the horse mussel. Our common species (*M. modiolus*, Turton) is from 4½ to 6 in. long and from 2½ to 3 in. wide; the shell is

thick, coarse, and rough, with the beaks subterminal; the color externally is chestnut or dark brown, pearly within. It inhabits deep water, attaching itself very firmly to rocks, from which it is torn in great numbers during violent storms; it is almost always more or less distorted, and has seaweed or some parasite attached to it; though too tough for food, it makes excellent bait for cod and other deep-sea fishes, but is very difficult to obtain when wanted. Other species live in brackish water; some in Europe are said to burrow and make a nest of sand and fragments of shells.—The fresh-water mussel (*anodon*) and river mussel (*unio*) are dimyarian, with a large foot not byssiferous in the adult; the hinge is toothed. The *A. fluviatilis* (Gould) has a thin, inequilateral shell, grassy green externally and lilac-tinted white within, and attains a length of 4½ in.; it is common in mill ponds and sluggish streams. Many other species of this genus, and of *unio* and allied genera in North America, have been specially described by Mr. Isaac Lea. Some of the unios, both in this country and in Europe, produce very fine pearls, and about 20 years ago there was a general pearl hunting in many parts of the United States, which resulted in the finding of a few valuable specimens after an immense amount of generally unprofitable labor. The pearl mussel of Europe (*U. margaritifera*, Linn.) has long been famous for the ornamental excretions found in its shell, some of which are of rare beauty.

MUSSET, Louis Charles Alfred de, popularly known as Alfred de Musset, a French poet, born in Paris, Nov. 11, 1810, died there, May 2, 1857. He was a son of VICTOR DONATIEN DE MUSSET (1768–1832), better known under the name of Musset-Pathay, a cousin of the marquis Musset de Cogners, and, like the latter, of literary distinction, especially for his writings about Rousseau. Alfred is said to have written a tragedy as early as 1826, and in 1828 he received a prize for a Latin dissertation. He alternated for some time between the studies of medicine, law, and art, and was for a short period attached to a banking house, but was encouraged in his predilection for literature by intercourse with Charles Nodier and Victor Hugo. His first work, *Les contes d'Espagne et d'Italie* (1830), revealed his poetic talent, and excited much attention and comment on account of the unbridled utterances of a fantastic and erotic imagination. His next important production, *Le spectacle dans un fauteuil* (1833), consisted of a tragical poem (*La coupe et les lèvres*), a graceful comedy or *imbroglia* (*A quoi rêvent les jeunes filles?*), and a kind of Byronic narrative in verse (*Namouna*), containing eloquent lines addressed to the Tyrolese, which were regarded by his admirers as the most classical production of the romantic school. More perhaps than any of his contemporaries he embodied in his effusions morbid and skeptical views of life, which mar to some extent the beauty of his exquisite poem

Rolla (1835), and of his *Confession d'un enfant du siècle* (1836; new ed., 1859). In the latter work he describes under fictitious names his journey to Italy with George Sand, and his relations with that authoress, which led her to publish in 1859 *Elle et lui*, and to the appearance in the same year of *Lui et elle* by Alfred's brother, PAUL EDMÉ DE MUSSET (born in Paris, Nov. 7, 1804, and known as the author of *Les femmes de la régence*, 2 vols., 1841, and other works), and to George Sand's refutation of the latter's allegation against her, in the preface to her novel *Jean de la Roche*, also in 1859. Alfred became in 1836 as devoted to Mme. Malibran as he had previously been to Mme. Dudevant. His *Poésies nouvelles* (latest ed., 1862) contain his *Strophes à la Malibran*, and his *Nuit de mai, de décembre, d'octobre et d'août*; these *Nuits* are regarded as the most beautiful of his lyrics, and as most deeply reflecting the conflicting emotions of his inner life. Among other fine effusions are his *Lettre à Lamartine* and *L'Espoir en Dieu*. During the political complications in 1840 he answered Becker's German war song in regard to the Rhine with a poem entitled *Nous l'avons eu, votre Rhin allemand*. The influence of the duke of Orleans, who had been his college classmate, had procured for him the office of librarian in the ministry of the interior; and he commemorated the death of that prince in 1842 in one of his most eloquent poems. He was deprived of his office at the revolution of 1848, but was restored to it after the establishment of the empire (1852), with the title of reader to the empress. His finest poetry was written before his 30th year, which made Heine say: *C'est un jeune homme d'un beau passé*. His *Contes* comprise *Mimi Perizon*, *Histoire d'un merle blanc*, and *La mouche* (1854). Among his best novelettes are *Emmeline* and *Margot*. He was less successful as a dramatist, though his *Un caprice* (3d ed., Paris, 1848), *Il ne faut jurer de rien* (1848), and *Il faut qu'une porte soit ouverte ou fermée* (1851), were received with great favor. A complete edition of his *Comédies et proverbes*, revised by himself, was published in 2 vols. in 1856. His complete works, with illustrations, and a biographical notice by his brother, appeared in 10 vols. in 1865-'6. His *Œuvres posthumes* (1867), include *Faustine*, an unfinished drama, *L'Âne et le ruisseau*, a graceful comedy, and poems and letters, one of the latter containing a picturesque account of Rachel's reading *Phèdre* to him in her house.

MUSSEY, Reuben Dimond, an American surgeon, born in New Hampshire in 1780, died in Boston, June 28, 1866. He practised his profession during the earlier part of his life with great success in his native state, and from 1814 to 1838 was connected with various medical professorships in Dartmouth college. He afterward removed to Cincinnati, where he was professor of surgery in the Cincinnati college of medicine and surgery from 1838 to 1852,

when he took the same chair in the Miami medical college, resigning in 1860 and removing to Boston. His surgical practice in Cincinnati and the neighboring country was large, and he was widely known and resorted to as a consulting surgeon. He was a prominent temperance lecturer, and advocated temperance in eating as well as drinking. He published "Health, its Friends and its Foes" (12mo. Boston, 1862).

MUSTARD, the name of a well known condiment as well as of the plants which produce it. In commerce two sorts of mustard seed are known, the white and the black, which are produced by plants formerly called *sinapis alba* and *S. nigra*; but in the most recent revision of the *cruciferae*, the family to which they belong, *sinapis* is reduced to *brassica*, the genus which includes the cabbage and the turnip, and according to this view the mustard plants are *brassica alba* and *B. nigra*. White mustard



Mustard.

is an annual, with a stem 1 to 2 ft. high, smooth or with a few spreading hairs; its leaves are pinnately lobed, more or less rough, the lobes coarsely toothed, with the terminal one the largest; the yellow flowers in a raceme, succeeded by pods three fourths of an inch to an inch long, bristly, upon spreading stalks and terminated by a stout flattened beak which forms more than one half of the pod and is one-seeded, while the lower part of the pod is turgid and contains several seeds; the seeds are pale brown or brownish yellow. Black mustard is a somewhat taller and smoother plant, and has less divided leaves; the pods are erect, smooth, about half an inch long, and somewhat four-sided, without the long beak, but tipped with the style, with much smaller and very dark brown seeds. Both species are natives of Europe, and are found in the older portions of this country as naturalized weeds. The seeds of both are sold by druggists; a portion of the supply is of home growth, the rest being

imported. White mustard is much used in England as a salad; the seeds are sown very thickly, and the young plants are cut while still in the seed leaf; cress (*lepidium sativum*) is usually sown with the mustard, and the product of the two together is known as "small salading." This species is sometimes cultivated in gardens as a pot herb or greens, the leaves being cooked while yet tender. In England mustard is much sown as a crop for forage and for green manuring, and the few experiments that have been made with it here have been favorable; sowed at the rate of about 12 lbs. to the acre, it gives an abundant crop of succulent forage, which is cut before the seeds begin to mature and fed to cattle, sheep, and swine. When either kind is raised for seed, it is cut with a sickle before it begins to drop its seed, and when dry threshed with a flail. The great consumption of mustard seed is in the preparation of the "flour of mustard" for table use; the black seeds are the most pungent, but both kinds are used together; the seeds are crushed between rollers, then pounded in mortars, and the finer portions sifted from the husks. This was first prepared in Durham, England, by a woman who kept her process a secret, and the name "Durham mustard" is used as a trade mark by manufacturers at the present day. There is probably no article of domestic consumption more generally adulterated than flour of mustard; wheat flour to increase the weight, turmeric to give color, and cayenne to add pungency, are the most common adulterations; sometimes gypsum or white clay is used with chrome yellow (chromate of lead) to increase the color. The microscope readily shows the presence of flour, turmeric, and other vegetable admixtures; but to detect the inorganic impurities recourse must be had to chemical analysis. The husks, separated by the sieves in the manufacture of mustard, yield by expression a bland fixed oil which is used for burning and other purposes; the cake left after expressing is used as a manure, it being too pungent for cattle food.—The two kinds of mustard seed differ in their chemical constituents, which in both are rather complex. The activity of black mustard seeds depends upon a volatile oil which does not exist ready formed in the seeds, but is developed only by the contact of water. The seeds contain myronic acid, in which sulphur is found in combination with oxygen, hydrogen, carbon, and nitrogen. Another principle is myrosine, an albuminoid which is affected by heat, alcohol, and other agents in the same manner as albumen. In the presence of water, myrosine and myronic acid react upon one another, and produce the volatile oil of mustard, or sulpho-cyanide of allyle, an exceedingly acrid and pungent liquid, which promptly blisters when applied to the skin. White mustard produces no volatile oil, but its activity depends upon a non-volatile acrid principle, which results from the action of myrosine upon sulpho-sinapisine, a con-

stituent of the white mustard seed only. Another respect in which white mustard seed differs from the black is the mucilage contained in the husks, which is readily imparted to boiling water.—Mustard has been employed in medicine from very early times, and is mentioned by Theophrastus and Galen, and it is still much used in domestic and professional practice. The whole seeds of the white mustard were at one time a popular remedy in dyspepsia; given in the dose of a tablespoonful, they probably served as a mechanical stimulus to torpid bowels. Serious inflammation has followed their use, and it should not be undertaken without advice. The flour of mustard is a useful emetic always at hand in case of poisoning or other emergency; the dose is from a teaspoonful to a tablespoonful stirred in a tumbler of water. As a topical stimulant, in the form of a mustard poultice or sinapism, it is in frequent use; when the mustard is pure, its action is sufficiently prompt if mixed with an equal bulk of rye meal or wheat flour; but much of that found in the shops is already so far diluted as to be nearly inert. For this or any other use the mustard should be mixed with cold or tepid water, as hot water coagulates the myrosine and prevents the development of the active principle. The ready-made mustard plaster sold by druggists consists of the black seeds reduced to a coarse powder, which is sprinkled upon paper or stiff cloth on which a coat of thick mucilage has been spread; when dry this will keep well, and when required for use is rendered active by dipping it in tepid water and bound upon the desired spot; this is more certain in its action and more cleanly in use than any other form of sinapism. As mustard varies so much in strength, and the skin of individuals in susceptibility, the action of mustard when applied should be closely watched, else a troublesome ulcer may be produced; this is especially necessary when the patient is unconscious.—As a condiment the uses of mustard are well known; it is mentioned by Shakespeare in "Taming of the Shrew," act 4, scene 3, though it did not become common until the time of George I. The English and Americans usually mix mustard with water and a little salt, but the French and Germans prepare it with various flavoring articles and usually cook it, depriving it of much of its pungency. The imported French mustard is of various flavors, that containing tarragon being much esteemed; celery seed, garlic, cloves, anchovies, and other things are used, and in some cases a peculiar flavor is given by stirring the mixture with a hot poker. German mustard is mixed with vinegar in which black pepper, cinnamon and other spices, and onions have been boiled, with salt and sugar added; the vinegar is used boiling, hence the mustard is very mild; it improves by keeping.—Wild mustard, the charlock of English farmers, is *brassica sinapis-trum* (formerly *sinapis arvensis*), a troublesome

weed in European agriculture, and equally so in the grain fields of some of the older parts of the United States; it bears a general resemblance to the two species already noticed, but its leaves are less divided, and the nearly smooth pods have their seed-bearing portion longer than the stout two-edged beak, which is either empty or one-seeded. The seeds of this, if buried so low that they will not germinate, retain their vitality for a long time, and have been known to vegetate when brought to the surface after having been buried more than 40 years. Sheep are exceedingly fond of it, and are sometimes used to clear a field of charlock. In Japan, India, and other countries related species are cultivated for their leaves as food, or for their seeds to furnish oil.—The attempts to identify the plant mentioned as mustard in the New Testament have given rise to much discussion; some still hold that the black mustard, which in Palestine grows 10 or 12 ft. high, is the plant, while others refer it to *Salvadora Indica*, which according to Boyle was the mustard tree of the Jews. The order *Salvadoraceæ* is a small one closely related to the jasmine family.—Hedge mustard is *sisymbrium officinale*, a common, much-branched, unsightly weed, of the same family; it is the *herb au chanfre* of the French, who formerly held it in esteem as a remedy for the hoarseness of singers. Tansy mustard is *S. canescens*, with finely divided leaves, common from New York southward.

MUTINA. See MODENA.

MUTINY (Fr. *mutin*, refractory, stubborn; *mutiner*, to rise in arms). A century ago the word mutiny was, as we learn from lexicographers, often used in describing insurrection or sedition in civil society; but it is now applied exclusively to certain offences by sailors and soldiers. Properly it is the act of numbers in resistance of authority; but by statutes certain acts of individuals are declared to be mutiny. The act of congress of March 3, 1835, defines mutiny or revolt in the following language: "If any one or more of the crew of any American ship or vessel on the high seas, or any other waters within the maritime and admiralty jurisdiction of the United States, shall unlawfully, wilfully, and with force or by fraud, threats, or other intimidations, usurp the command of such ship or vessel from the master or other lawful commanding officer thereof; or deprive him of his authority and command on board thereof; or resist or prevent him in the free and lawful exercise thereof; or transfer such authority and command to any other person not legally entitled thereto; every such person so offending, his aiders and abettors, shall be deemed guilty of a revolt or mutiny and felony." The same statute provides for endeavors and conspiracies to excite mutiny. In construction of the act it has been held that mere disobedience of orders by one or two of the seamen, without any attempt to excite a general resistance

or disobedience, and insolent conduct or language toward the master or violence to his person, if unaccompanied by other acts showing an intention to subvert his authority as master, are not sufficient to constitute the offence of endeavoring to excite mutiny. An indictment for this crime, it is said, must set forth a confederacy of at least two of the men to refuse to do further duty, and to resist the lawful commands of the officers. The offence of making a revolt was by the act of April, 1790, punishable by death. By the act of 1835, now in force, it is punished by fine not exceeding \$2,000, and by imprisonment and confinement at hard labor for not more than 10 years, according to the nature and aggravation of the offence; while attempts to excite mutiny are punishable by fine not exceeding \$1,000, or by imprisonment not exceeding five years, or by both. Sailors refusing to go to sea from reasonable apprehension of the unseaworthiness of the vessel are not punishable as for a revolt under the act; neither are those who refuse to do duty after a deviation from the voyage named in the shipping articles. Mutinous conduct in the army and navy is provided for by the acts of April 10, 1806, and of April 23, 1800. In the navy it is punishable with death; in the army with death or such other punishment as a court martial may inflict.

MUTTRA, a city of British India, in the Northwestern Provinces, capital of a district of the same name, on the W. bank of the Jumna, 30 m. N. N. W. of Agra; pop. in 1872, 51,540. It is picturesquely built on high ground in the form of a crescent, and was once well fortified. Flights of stone steps, or ghauts, adorned with temples, lead down to the river, which is accounted sacred by the Hindoos, and every day crowds of devotees frequent its banks to perform their religious rites. The streets are steep, narrow, and dirty, and rendered more difficult by deep ravines which run through the town. There are some striking ruined buildings, among which is a fort, having on its roof an observatory with astronomical instruments. One of the most beautiful edifices is a temple and dwelling house together, built by a former treasurer of the state of Gwalior, and approached through a richly carved gateway. The British have extensive cantonments about a mile distant. Muttra is held in great reverence by the Hindoos as the birthplace of Krishna, and is overrun with sacred monkeys, bulls, paroquets, and peacocks, which are fed and protected, but allowed to go at large in the streets. The wealth and importance of the place were formerly much greater than at present. Mahmoud of Ghuzni sacked it in 1017, and carried off or destroyed an enormous amount of treasure. Among other rich specimens of handicraft, he found five idols of gold with eyes of rubies, and 100 idols of silver, each as large as a camel could carry. At the commencement of the present century the town was taken by Sindia, who bestowed it

on the French adventurer Perron; and in 1803 it was occupied by the British troops, and soon afterward ceded to the East India company. A detachment of sepoys mutinied at Muttra in the latter part of May, 1857, shot their British officers, and marched to Delhi.

MUTTRA, or **Matara**, Arabia. See **MUSCAT**.

MUYSCAS, or **Chibchas**, a nation of South American Indians in what is now the United States of Colombia. They were highly advanced in civilization, founded an empire, and reduced all the tribes between Serinza, lat. 6° N., and Suma Paz, 4° S., including the table lands of Bogotá and Tunja. At the time of the Spanish conquest the Maysca or Chibcha empire, including the less civilized conquered tribes, had a population estimated by Acosta and Uricoechea at 1,200,000, and by others at 2,000,000. They were divided into three independent nations, governed by the *zipa* residing at Funza, the *zaqui* at Tunja, and the *jeque*, an ecclesiastical chief residing at Sogamoso. The greatest of the line of zipas was Sagnanmachica. They honored Nemterequeteba as the great mythical civilizer of the race. They worshipped the sun and a number of inferior deities, but offered human sacrifices only to the sun. They had two great temples at Suamoz and Leiva. Their priests were called *jeques*. They made offerings by throwing precious objects into the lakes. They had a kind of week of 3 days, 10 making a month; 20 months were a year, and 20 years an age. Succession was in the female line. They cultivated maize, potatoes, and quinoa, and made a spirituous liquor of maize; used rafts and balsas in fishing; raised cotton, and spun and wove cloth, in which they were decently dressed. They wore square mantles, some of them dyed and painted. They were ingenious carvers of bone, wood, and stone, and worked in precious metals. They were a commercial people, had a rude kind of money, and carried on a trade in painted mantles, gold ornaments, salt, and emeralds. They taught parrots to talk, and sacrificed them instead of human beings. Their houses were of wood and clay, with conical roofs, surrounded by a palisade. The floor was covered with mats, and benches were ranged around as seats. They buried in caverns. Chibcha seems to have been their real name, Chibchacum being the national deity. Maysca means men.—The Chibcha language was cultivated by Gonzalo Bermudez, José Dadei, and Bernardo de Lugo (*Gramática mosca*, Madrid, 1619). There is a recent *Gramática, vocabulario, catecismo i confesionario de la lengua Chibcha*, by E. Uricoechea (Paris, 1871). There is no *d*, *l*, or *r*. There are two conjugations, and inseparable pronouns; there is no variation in tense for person or number, and no gender, case, or number in nouns. The language is generally represented as having been lost about 1765, but it is still spoken by some bands on the Meta, &c., who represent this ancient civilized race.

MUZIANO, Girolamo, an Italian artist, born at Acquafredda, near Brescia, in 1528, died in Rome in 1590 or 1592. He established himself in Rome about the middle of the century, and became known both as a landscape and historical painter. The churches of Rome and other Italian cities contain many fine works by him in oil and fresco; and there is also a celebrated "Christ Washing the Feet of his Disciples" in the cathedral of Rheims, which has been engraved by Desplaces. He was almost equally celebrated as a mosaic worker. His chief architectural work is the chapel of Gregory XIII. in St. Peter's. He was instrumental in founding the academy of St. Luke at Rome, the brief for the establishment of which he procured from Gregory XIII. Many of his pictures have been engraved.

MUZZEY, Artemas Bowers, an American clergyman, born in Lexington, Mass., Sept. 21, 1802. He graduated at Harvard college in 1824, and at the Cambridge divinity school in 1828, and was ordained pastor of the Unitarian society in Framingham, Mass., June 10, 1830. He resigned this post in May, 1833, and became pastor successively of the Unitarian churches in Cambridgeport, Jan. 1, 1834; Lee street, Cambridge, in July, 1846; Concord, N. H., in March, 1854; and Newburyport, Mass., Sept. 3, 1857, from which he retired in May, 1865. He has published "The Young Man's Friend" (1836); "Sunday School Guide" (1837); "Moral Teacher" (1839); "The Young Maiden" (1840), which has passed through many editions; "Man a Soul" (1842); "The Fireside" (1849); "The Sabbath School Hymn and Tune Book" (1855); "Christ in the Will, the Heart, and the Life," a volume of sermons (1861); "The Blade and the Ear, Thoughts for a Young Man" (1864); "Value of the Study of Intellectual Philosophy to the Minister" (1869); "Leaves from an Autobiography," in the "Religious Magazine" (1870-'72); "The Higher Education" (1871); and numerous tracts, sermons, and essays, and reports on common schools and Sunday schools.

MYCALE (now *Samsun*), a mountain in the south of Ionia in Asia Minor. It is the W. extremity of Mt. Mesogis, and runs out into the sea in a promontory called Mycale or Trogylium (now Cape Santa Maria), directly opposite Samos, from which it is separated by a strait three fourths of a mile wide. This strait was the scene of the great naval victory of the Greeks under Leotychides and Xanthippus over the Persian fleet in September, 479 B. C. On the N. side of the promontory was the temple of Neptune, where the Panionic festival of the Ionian confederacy was held. On or near the promontory there appears to have been a city of the same name.

MYCENÆ, or *Mycene*, a city of ancient Greece, situated on a rocky hill at the N. E. extremity of the plain of Argos. It is said to have been founded by Perseus, and its massive walls were deemed the work of the Cyclops. It is spoken

of as the favorite residence of the Pelopidæ, and as the principal city of Greece during the reign of Agamemnon. From the period of the Dorian conquest its importance declined; but it still maintained its independence, and in the Persian war contributed its quota of troops. This brought upon it the enmity of the other Argives, who about 468 B. C. laid siege to Mycenæ, reduced it by famine, and destroyed it. It was never rebuilt, but its remains, near the modern village of Kharvati, are among the grandest and most interesting of the antiquities of Greece. Part of the walls of the acropolis, to the height in some places of 15 or 20 ft., are still standing, and at the N. W. angle may yet be seen the great entrance to the citadel, styled the "gate of lions" from the two beasts, considered lions, sculptured in a triangular block of gray limestone, supported by two massive uprights. Some suppose that it represented the altar of the deity of the sun, worshipped at Mycenæ. The most remarkable of



Gate of Lions, Mycenæ.

its other antiquities is the subterranean vault commonly called "the treasury of Atreus," consisting of two chambers, the larger of which is of circular form, 40 ft. high and 50 ft. broad. The lintel of the entrance is formed by two huge blocks, the lower of which is 25 ft. long, 20 ft. wide, and 4 ft. thick, and the other, still covered with earth, is probably of the same dimensions. Except in the ruins of Baalbek, these are the largest blocks found in the walls of buildings. The circular room consists of numerous horizontal rows of stones placed above each other in circles gradually diminishing in diameter. Several archaeological societies and private persons, among them Schliemann, have recently entered upon negotiations with the Greek government for the disinterment of the entire acropolis.

MYCONI, or *Mycono* (anc. *Myconus*), an island of Greece, in the Ægean sea, one of the Cyclades, lying E. of Delos and N. of Naxos,

about 10 m. long and 6 m. wide; pop. about 6,000. Its highest summit has two peaks, whence Pliny calls it *dimastrus*. Corn, wine, cotton, and figs are produced. In ancient times it was famous for the number of bald persons among its inhabitants.

MYER, Albert J., an American meteorologist, born in Newburgh, N. Y., Sept. 20, 1828. He graduated at Geneva college in 1847, took the degree of M. D. at the university of Buffalo in 1851, and in 1854 was appointed assistant surgeon in the United States army. From 1858 to 1860 he was on special duty in the signal service, and in the latter year was made major and chief signal officer in the army, serving in New Mexico and the Rocky mountains till May, 1861. In June he was made signal officer on the staff of Gen. Butler at Fortress Monroe, and afterward of Gen. McClellan, and took part as chief signal officer in nearly all the engagements during the peninsular campaign. In November, 1862, he took charge of the signal office at Washington. He was successively brevetted as lieutenant colonel, colonel, and brigadier general, the last being for "distinguished services in organizing, instructing, and commanding the signal corps of the army, and for its especial service Oct. 5, 1864," at Alatoona, Ga. He was made colonel and chief signal officer in the army in July, 1866, and introduced a full course of study of signals at West Point and Annapolis. By virtue of an act approved Feb. 9, 1870, he was charged with the special duties of the observation and giving notice by telegraph and signals of the approach and force of storms on the northern lakes and seacoast, at the military posts in the interior, and at other points in the states and territories. He organized the meteorological division of the signal office, being assigned to duty according to his commission as brevet brigadier general in June, 1871. By an act approved March 3, 1873, he was placed in charge of the special duties of telegraphy, &c., being authorized to establish signal stations at lighthouses and at such of the life-saving stations as are suitable for the purpose, and to connect these stations by telegraph with such points as may be necessary. In 1873 he was a delegate to the international meteorological congress at Vienna. He has published a "Manual of Signals for the United States Army and Navy" (1868).

MYERS, Peter Hamilton, an American novelist, born in Herkimer, N. Y., in August, 1812. He has published "The First of the Knickerbockers, a Tale of 1673" (New York, 1848); "The Young Patroon, or Christmas in 1690" (1849); "The King of the Hurons" (1850), republished in England under the title of "Blanche Montaigne;" and "The Prisoner of the Border, a Tale of 1838" (1857). He has also written several tales, and "Ensenore, a Romance of Owasco Lake," and other poems. He now (1875) resides in Auburn, N. Y.

MYGALE. See SPIDER.

MYLITTA, the Greek name of the Babylonian goddess Beltis or Bilit, "the Lady." She is commonly represented as the wife of Bel-Nimrod (Belus), and the mother of his son Nin, though she is also called the wife of her son Nin. She united the characteristics of the Juno, Venus, and Diana of classical mythology, but was chiefly the goddess of birth and fertility. She had temples at Nineveh, Ur, Erech, Nipur, and Babylon. The Baaltis of the Phœnicians was the same in name and character. The young women of Byblos, like those of Babylon, sacrificed in her service their virginity, and gave the price they received to the temple of the goddess. The Derceto of Ascalon, the Ashera of the Hebrews, and the Ish-tar of the Babylonians were kindred divinities.

MYLODON (Gr. *μύλη*, mill, and *ὀδός*, tooth), a genus of gigantic fossil edentates established by Prof. Owen, and closely allied to the sloth, resembling *megalonix* and *megatherium*. The mylodon has the heavy form of the megatherium, with a dentition resembling that of the megalonyx; the molars are $\frac{4}{5}$ — $\frac{5}{6}$, and are worn into flat surfaces; in the upper jaw, the first is subelliptical and separated from the rest, the second elliptical, and the others triangular, with the internal surface grooved; in the lower jaw, the first is elliptical, the third quadrangular, and the last the largest and bilobed, and the symphysis stronger than in the megalonyx. The head resembles that of the megatherium in its form, and has a strong descending process of the zygomatic arch; the extremities are equal, the anterior five-toed, and the posterior four-toed; the two external fingers are without nails, and the others have large semi-conical and unequal claws; the acromion and coracoid are united, the radius turns around the ulna, the tibia and fibula are distinct, the heel bone long and large as in the other megatherioids. (See *MEGALONYX*, and *MEGATHERIUM*.) The *M. Darwinii* (Owen) was discovered by Mr. Darwin in northern Patagonia; the symphysis of the lower jaw is long and narrow, with the second molar subelliptical, and the last with two furrows, of which the internal is angular; it is found from the pampas of Brazil southward. The *M. Harlani* (Owen) has the symphysis shorter and wider, the second molar square, and the last with three grooves, the internal one biangular; this has been found in Kentucky, Mississippi, Missouri, South Carolina, and Oregon. The *M. robustus* (Owen) is characterized by a short and wide symphysis, with the second molar subtriangular, and the last with three grooves, of which the internal is rounded. A fine and nearly complete skeleton of this species is now in the museum of the London college of surgeons; it was discovered in 1841 in the fluviatile deposits about 20 m. north of Buenos Ayres, recently elevated above the level of the sea. The skeleton is very robust; the trunk, shorter than that of the hippopotamus, ends in a pelvis as wide as and deeper than that of the elephant; the hind

limbs short and massive, with feet as long as the thigh bones, set at right angles to the leg, and with the sole turned slightly inward; the tail as long as the hind limbs, very thick, and affording a firm support in the semi-erect position; the chest long and large, protected by



Mylodon robustus (restored).

16 pairs of ribs, broad and strongly attached to a well developed sternum; the scapulæ unusually broad; arm bones thick and short, with strong processes for muscles; the bones of the forearm longer than those of the leg; the skull smaller than that of the ox, but long, narrow, with a truncated muzzle, and supported by a short neck of seven vertebræ; dorsal vertebræ 16, with broad and high spinous processes nearly equal and having a uniform backward inclination. Such proportions are found in no living animals, and only in the megatherioids among fossils. The skull presented two extensive fractures, from which the animal had recovered; the air cells extend from the frontal and ethmoidal sinuses into the cranial bones, separating the two tables of the skull sometimes for the extent of 2 in., forming a great protection against injury from falling limbs of trees. They were probably peaceful animals like the existing sloths, though able to inflict severe wounds by their sharp and heavy claws; the muscular strength of the edentates is very great, and must have been immense in all the megatherioids. While presenting the closest affinity to the small arboreal sloths, the mylodon, with its claw-armed inner toes, had the outer thick and stunted, and evidently enveloped in a kind of hoof, giving the power of standing and walking firmly as well as digging and seizing—in this respect marking a transition between edentates and pachyderms. It is now generally admitted that this animal commenced the process of prostrating trees by scratching away the soil from their roots, and loosening them from their attachments; then, seizing the branches or trunk, and supported on the hind limbs and tail, it swayed the tree

to and fro, and soon brought it to the ground to be stripped at its leisure; in case of meeting a tree too large to be uprooted, it is probable that some of the smaller species, as indicated by the inward turning of the soles, possessed the faculty of climbing to the larger branches within reach of the foliage. In regard to the means of stripping off leaves, Prof. Owen, from the cavity in the mastoid process for the articulation of the hyoid bone, and the large size of the anterior condyloid foramina whence issue the motor nerves, maintains that there was a remarkable development of the tongue; this is also indicated by the broad, smooth, concave surface of the symphysis of the lower jaw, which, with the absence of incisors, offered no obstacle to its free motions, and provided space for it when retracted; the megatherium had a short proboscis, prehensile lips, and a smaller tongue in a narrower mouth; the elephant has a maximum proboscis, the giraffe a maximum tongue, the megatherium being intermediate; the mylodon, having no proboscis, had a largely developed tongue for stripping off foliage, contrasting in this respect with the almost tongueless elephant. While the megatherium may have measured 18 ft. from the fore part of the skull to the end of the tail, following the curve of the spine, the mylodon measured only 11 ft.; other measurements in these animals respectively were: circumference at pelvis $14\frac{1}{2}$ and $9\frac{3}{4}$ ft.; length of skull $2\frac{3}{4}$ and $1\frac{1}{2}$ ft., greatest width $1\frac{1}{2}$ and $\frac{1}{2}$ ft.; length of lower jaw $25\frac{1}{2}$ and $15\frac{1}{2}$ in., width at symphysis $5\frac{3}{8}$ and $5\frac{1}{8}$ in.; length of anterior limb 10 and $4\frac{1}{2}$ ft.; clavicle 15 and $8\frac{1}{2}$ in., humerus $2\frac{1}{2}$ and $1\frac{1}{8}$ ft., ulna $25\frac{1}{2}$ and $14\frac{1}{2}$ in., radius 26 and 11 in.; fore foot $31\frac{1}{2}$ and 14 in. long, and $14\frac{1}{2}$ and $8\frac{1}{2}$ wide; middle and longest claw $10\frac{1}{2}$ and $5\frac{1}{2}$ in.; width of pelvis 61 and 41 in.; length of femur $28\frac{1}{2}$ and 19 in., circumference over great trochanter $3\frac{1}{2}$ and $2\frac{1}{2}$ ft., and width at same point 16 and 9 in.; tibia 22 and $8\frac{1}{2}$ in.; length of hind foot $34\frac{1}{2}$ and 19 in., width 12 and $6\frac{3}{4}$; heel bone 17 and $7\frac{1}{2}$ in.; middle and largest claw $9\frac{1}{2}$ and $5\frac{1}{8}$ in.; and width of largest vertebra of tail 21 and $10\frac{1}{2}$ in.—The scelidotherium (Gr. σκελῖς, hind leg, and θήριον, animal) is another extinct megatherioid, remarkable for the size of the hind limbs; a nearly entire cranium shows the essential characters of the sloth's skull, with the mylodontal modifications of the complete zygoma and shape of the lower jaw; the teeth were $\frac{2}{3}$ — $\frac{2}{3}$, the upper triangular; the form was massive. Pictet mentions seven species, varying in size from a hog to an ox, which lived in South America during the diluvial epoch. Some other genera have been described by Owen, Pictet, and Leidy.

MYRIAPOD. See CENTIPEDE.

MYRMECOBIUS, a genus of marsupial animals, established by Waterhouse, of which the typical species is the *M. fasciatus* of southern and western Australia. The teeth are very numerous, being incisors $\frac{2}{3}$, canines $\frac{1}{2}$ — $\frac{1}{2}$, premolars $\frac{3}{4}$ — $\frac{3}{4}$, molars $\frac{2}{3}$ — $\frac{2}{3}$ =52. The fore feet are

five-toed, with sharp nails for climbing and digging; hind feet four-toed, all free; head elongated, and snout acute; body slender; tail moderate and bushy. Length 10 in., tail 7 in. additional. The general color of the fore part of the body is reddish, gradually shading into the black of the posterior half, which has seven to nine white transverse bands; fur coarse above and finer underneath, below fulvous



Myrmecobius fasciatus.

white. They have no pouch, the young, five to eight in number, being protected by the long hairs of the under side of the body. They are gentle, active, and squirrel-like animals, feeding on insects, especially ants, which they obtain by their long and extensile tongue, and on sweet vegetable juices; they are seen generally on trees, in whose hollows they live. The fossil *amphitherium* or *thylacotherium*, of the lower oolite of Stonesfield, England, resembled the myrmecobius, as also did the *dromatherium* of the trias of North Carolina, and the *microlestes* of the trias of central Europe.

MYRMELEON. See ANT LION.

MYRMIDONES, an ancient Achæan race of Phthiotis in Thessaly. According to the legendary account, they originally came from Ægina, where, at the request of Æacus, Jupiter changed all the ants (*μύρμηκες*) of the island into men, who from their origin received the name of Myrmidones. They subsequently followed Peleus into Thessaly, and accompanied his son Achilles in the expedition against Troy. Other legends make them the descendants of Myrmidon, a son of Jupiter and Eurymedusa, whom the god deceived in the disguise of an ant. They do not appear in authentic history. From them is derived the word *myrmidons*, designating a band of rough soldiers or ruffianly marauders devoted to the will of a leader.

MYRON, a Greek sculptor, born in Eleuthera, Bœotia, about 480 B. C. Besides representing the human figure in difficult attitudes, he modelled animals with success. His masterpieces were nearly all in bronze. The most celebrated were his *Discobolus*, or quoit player, and his "Cow." There are several marble *Discoboli* still extant, copies of the original. Of his other works, perhaps the most famous were his colossal statues of Jupiter, Minerva, and Hercules at Samos, which were carried off by Mark Antony. Augustus restored Minerva

and Hercules to the Samians, retaining only Jupiter, which he placed in the capitol.

MYRRH (Heb. *mor*), a gum resin mentioned in the Old Testament as an article of commerce, and one of the oldest medicinal articles of which we have any record. Though the drug has been well known for many centuries, its origin was long obscure; it was once supposed to be produced by an *acacia*, and it has been attributed to other genera. Nees von Esenbeck in 1826 described the myrrh-yielding tree from specimens brought home by Ehrenberg as *balsamodendron myrrha*, and this was accepted as the plant till 1863, when Berg in studying the specimens found that the one indicated by Ehrenberg as furnishing myrrh was quite different, and he described it as *B. Ehrenbergianum*, in honor of the collector. The genus *balsamodendron*, by some referred to *terebinthaceæ*, is now placed in *Burseraceæ*, a small family of plants which have aromatic resinous juices, and are nearly related to the orange and rue families. About six species of the genus are recognized, all shrubs or small trees inhabiting Africa, Arabia, and other parts of Asia; the general character of their foliage and flowers is shown in the illustration. The drug, which is probably the product of more than one species, is a natural exudation, which may be increased by wounding the bark of the tree; it is at first light yellow and soft, but becomes darker and harder as it dries. Like many other eastern drugs, myrrh is known in commerce by the names of the places whence it is exported rather than those which produce it, and we have Turkey or Smyrna, and East



Myrrh (*Balsamodendron Ehrenbergianum*).

Indian or Bombay myrrhs, though they are collected in Arabia and Abyssinia. Myrrh occurs in lumps or tears of variable size, which are whitish upon the exterior from the powder produced by attrition; it is brittle, reddish yellow or reddish brown, semi-transparent,

and with a dull oily kind of fracture; its odor is aromatic, characteristic, and pleasant to most persons; it has an aromatic and bitter taste. Though known in commerce as gum myrrh, it is a true gum resin, containing nearly 28 per cent. of two kinds of resin, about 64 per cent. of gum, some volatile oil, &c. It is imported in chests of about 200 lbs., which contain lumps of various qualities; it is sorted by the dealers into myrrh of two or three grades. The chests often contain inferior gums added accidentally or intentionally; one of the most frequent is a gum resembling senegal, which is readily recognized by its shining fracture and lack of proper taste; bdellium, also found as an impurity, is distinguished by being softer and darker colored. Alcohol dissolves the resin and volatile oil of myrrh, leaving the gum, and a tincture represents the active portions of the drug. When triturated with water the gum dissolves, and the finely divided resin and oil are held in suspension and form a milky emulsion, one of the forms in which myrrh is administered. The Hebrews employed myrrh in preparing the ointment for the rite of consecration, and it is mentioned as one of the articles used in the purification of women, in embalming, and as a perfume. It is now employed in medicine as a stimulant and tonic; it is seldom prescribed alone, but with preparations of iron and vegetable bitters; it is given in doses of from 5 to 20 grains or more. Externally myrrh is employed to stimulate indolent ulcers and to dress wounds that are slow of healing, and is a popular remedy for soft and spongy gums, for which purpose the tincture largely diluted with water is used. It has been proposed to utilize the residue after the preparation of the tincture for the manufacture of a coarse mucilage.

MYRTLE, a name which, with or without a prefix, is given to several widely different plants, but properly belonging to *myrtus communis*, an evergreen shrub of the Mediterranean region, which is the type of a very large and important order, the *myrtaceæ*. The myrtle family consists of trees or shrubs, with simple, entire, mostly aromatic leaves, which are marked by pellucid or resinous dots, and are without stipules; the flowers are perfect, the calyx tube adherent to the ovary, and the petals and numerous stamens borne upon the throat of the calyx tube or upon a disk which borders it; the fruit a berry or capsule; seeds without albumen. This family abounds in the tropics and the southern hemisphere; a few species belonging to the genera are found in southern Florida. Among the important plants and products of this family are the clove, allspice, guava, cajeput, rose apple, Brazil and Sapucaya nuts, and the gigantic and useful eucalyptus trees of Australia. The common myrtle is a shrub, which even in favorable situations does not exceed 20 ft. in height, with opposite shining leaves and axillary peduncles, each bearing a single white or rose-tinged flow-

er, which is succeeded by a several-seeded berry. The plant, having been so long in cultivation, presents numerous varieties differing in the size and shape of their leaves and color of the fruit; the latter is naturally black, but there are white-berried varieties, as well as those



Common Myrtle (*Myrtus communis*).

with their leaves striped and spotted with white or yellow markings. In England the myrtle is barely hardy in the southern counties, and in our northern states it is only seen as a pot plant, or grown in tubs to decorate the grounds in summer, and removed to the cellar or a pit for the winter. In those southern localities where the camellia and Cape jasmine live without protection the myrtle is hardy. As with many other plants known to the ancients, there are numerous legends attaching to the myrtle; it was sacred to Venus, and the temples of that goddess were surrounded by groves of myrtle; wreaths of it were worn by the Athenian magistrates as symbols of authority, and the victors in the Olympic games were crowned with it. The buds and berries were formerly used to flavor many dishes, and they had a reputation for medicinal properties, the aromatic berries and other portions of the plant being tonic and stimulant. The Tuscans used the plant in the preparation of a wine called *myrtidanum*. At present the chief use of the myrtle is in perfumery. *Eau d'ange* is a very fragrant astringent water, distilled from the flowers; the leaves mixed with other aromatics are used for sachet powders. The wood is hard and handsomely mottled, but its use is confined to small articles of turnery. Bay rum owes its peculiar fragrance to a volatile oil obtained from the leaves of *myrcia acris*, a West Indian plant of this family. The myrtle is readily propagated from cuttings of the just hardening young shoots.—The plant known in this country as myrtle or running myrtle belongs to a very different family. (See

PERIWINKLE.) The candleberry or wax myrtle is *myrica cerifera*. (See BAYBERRY.) Sand myrtle is *leiothymum buxifolium*, a pretty low shrub of the heath family, found in the pine barrens of New Jersey and southward.—Crape myrtle is the common name for *Lagerstræmia Indica*, a shrub largely planted for ornament in Virginia and southward. It does not belong to the myrtles proper, but to the loosestrife family (*Lythraceæ*). It is a much-branched shrub, 6 to 10 ft. or more high, with smooth, oval, opposite leaves, and large panicles of showy flowers; the petals are upon slender claws, and are waved and crimped in such a manner as to give them an exceedingly beautiful appearance, and to suggest the fabric known as crape; the stamens, which are in long silky tufts, add to the beauty of the flowers. The usual color of the flowers is a pale rose, but recently a white and several very dark-colored varieties have been introduced. The plant is a native of the East Indies, and the genus was named in honor of Lagerström, a



Crape Myrtle (*Lagerstræmia Indica*).

Swedish naturalist. In northern localities it may be grown as a tub plant with a treatment like that of the oleander.

MYISIA, in ancient geography, a N. W. division of Asia Minor, the boundaries of which greatly varied at different periods. In the time of the early Roman emperors it was bounded N. by the Propontis (sea of Marmora), N. E. in part by the Bithynian Olympus, S. E. by Phrygia, S. by Lydia, W. by the Ægean, and

N. W. by the Hellespont (strait of Dardanelles). It thus included, among other territories, those of Troas in the northwest, and Teuthrania (which included Pergamus), as well as the Grecian coast land of Æolis, in the southwest. Mysia was for the most part mountainous, the principal ranges within its boundaries being Mt. Ida in Troas, Mt. Temnus, which extended from the former to the borders of Phrygia, dividing the country into two unequal parts, and Mt. Olympus on the northeastern or Bithynian border. Of the principal rivers, the Caicus and Evenus flowed into the Elaitic gulf, on the S. W. corner; the Satniois into the Ægean, N. of Cape Lectum; the Scamander and Simois, renowned in Trojan legends, into the Hellespont, near Cape Sigeum; the Granicus, on the banks of which Alexander the Great achieved his first victory over the Persians (334 B. C.), the Æsepus, Tarsius, Macesus, and Rhyndacus, into the Propontis. The largest gulf was that of Adramyttium (now Adramyti) on the Ægean, opposite the island of Lesbos. Mysia is more renowned in legendary traditions than in history, the chief interest attaching to the territories of Troas, Pergamus, and the Æolian confederacy. Some suppose the Mysians to have been of Thracian race and immigrants from the countries south of the Danube afterward known as Mœsia, and others make them offshoots of the Lydians. Egyptologists think they can recognize their name in inscriptions of very ancient date. Having been successively under the dominion of Croesus, the Persian kings, Alexander of Macedon, his general Lysimachus, and the Seleucidæ, Mysia was assigned by the Romans, after their victory over Antiochus the Great (190), to the new kingdom of Pergamus, which had previously been formed from one of its parts, and with the whole of that kingdom was bequeathed to the Roman republic by King Attalus III., thus becoming a part of the proconsular province of Asia (133).

MYSOORE. I. A native state of India, under British protection, situated between lat. 11° 30' and 15° N. and lon. 74° 45' and 78° 45' E., and surrounded on all sides by the province of Madras, except where bordered by Coorg on the west and Bombay on the north; area, 27,717 sq. m., of which about 9,000 are under cultivation; pop. in 1872, 5,055,412. The state comprises three divisions for governmental purposes, Nandidroog, Ashtagram, and Nagar; the chief towns are Bangalore, Mysore, and Seringapatam. The country consists of an interior table land elevated from 2,000 to 3,000 ft. above the sea, rising westward to the Western Ghauts, which separate it from the seaboard. The principal rivers are the Cavery, Tungabudra, and the N. and S. Pennar. There are no natural lakes, but many large tanks and artificial reservoirs in the high grounds. The level of the table land is interrupted in places by large masses of granite, rounded in their outlines, standing singly or in clusters. The cli-

mate is healthful. The average annual rainfall is about 30 inches. Mysore not only produces the grains, vegetables, and fruits common to southern India, but also many of those belonging to the temperate regions. A considerable portion of the surface is covered with jungle. Rice, sugar cane, *ragi*, a species of coarse grain, and wheat are the chief crops raised. The betelnut palm and the castor oil plant thrive well. Carbonate of soda, salt, and iron are found. The inhabitants are principally Hindoos; in 1872 there were 230,518 Mohammedans, 15,241 Christians, 14,600 Buddhists, and 2,843 of other creeds. The Roman Catholics claim about 20,000 converts. Coarse blankets, carpets, shawls, and cotton cloths are manufactured. There are 3,072 m. of roads in the country, and 48½ m. of railway. The total number of schools during 1871-'2 was 2,683, of which 603 were government institutions.—Mysore is mentioned in the Hindoo mythological writings; but the authentic history of the country commences with the Mohammedan invasion in 1326, when it was incorporated with the empire of Delhi. The affairs of that empire soon afterward falling into confusion, Mysore was lost, and some Hindoos escaping from Mohammedan persecution in the north founded a city on the banks of the Tungabudra, which became the capital of a new state comprising nearly the whole of Mysore and part of the Carnatic; but in 1565 its ruler, Ram Rajah, was defeated and slain by the army of a Mohammedan confederation, and his capital taken and depopulated. A Mysorean chief, named Rajah Wadeyar, acquired possession of the fort and island of Seringapatam, and his successors, by a career of aggression, toward the close of the 17th century had extended their authority over the whole table land of Mysore. In 1731 the minister deposed the rajah, and in 1749 Hyder Ali made his appearance as a volunteer in the army of Mysore, and ultimately rose to be sovereign of the country. Upon the death of his son Tippoo Sahib in 1799, the British annexed a considerable portion of his dominions to their Indian possessions, and allotted the territory now known as Mysore to the descendant of the rajah who had been supplanted by Hyder Ali; but the country having fallen into a deplorable condition under his government, Lord W. Bentinck, the governor general of India, placed the civil and military administration in the hands of a British commission, though the rajah still nominally retained authority. The rajah died childless in 1868, and a chief commissioner, who is directly responsible to the governor general of India, now administers the government in the name of the rajah's adopted son, who is a minor. (See HYDER ALI, TIPPOO SAHIB, and SERINGAPATAM.)

II. A city, capital of the state, 7 m. S. S. W. of Seringapatam, and 250 m. W. S. W. of Madras, in lat. 12° 19' N., lon. 76° 42' E.; pop. in 1872, 57,765. The town is built upon two small hills or parallel elevated ridges, 2,450 ft.

above the sea, and is fortified by a wall of earth with a moat, and by a quadrangular fort, within which stands the palace of the titular rajah. The buildings of the town are generally good, and the streets regular and well kept. The want of a sufficient supply of good drinking water is severely felt, and is the main cause of the unhealthiness of the place. Carpet making is the chief industry. Mysore has always been the nominal and historic capital of the district; but it was neglected in favor of Seringapatam by Hyder Ali and his son, and has only recovered from its position of secondary importance within the present century.

MYSTERIES (Gr. *μυστήρια*, from *μύειν*, to shut the lips), ceremonies in ancient religions to which only the initiated were admitted. They may be obscurely traced in the early Orient, in the rites of Isis and Osiris in Egypt, in the Persian Mithraic solemnities, and in the festivals introduced into Greece through the worship of Bacchus and Cybele; and they lingered through the decline of Rome, and perhaps left their traces in the ceremonies of freemasonry. They consisted, in general, of rites of purification and expiation, of sacrifices and processions, of ecstatic or orgiastic songs and dances, of nocturnal festivals fit to impress the imagination, and of spectacles designed to excite the most diverse emotions, terror and trust, sorrow and joy, hope and despair. The celebration was chiefly by symbolical acts and spectacles; yet sacred mystical words, formulas, fragments of liturgies, or hymns were also employed. There were likewise certain objects with which occult meanings that were imparted to the initiated were associated, or which were used in the various ceremonies in the ascending scale of initiation. The sacred phrases, the *ἀπόρρητα*, concerning which silence was imposed, were themselves symbolical legends, and probably not statements of speculative truths. The most diverse theories have been suggested concerning the origin, nature, and significance of the Hellenic mysteries. As Schömann remarks (*Griechische Alterthümer*, 3d ed., Berlin, 1873), the very fact that it was not permitted to reveal to the uninitiated wherein these cults consisted, what were the rites peculiar to them, for what the gods were invoked, or what were the names of the divinities worshipped, has been the cause of our extremely incomplete information in regard to them.—The oldest of the Hellenic mysteries are believed to be those of the Cabiri in Samothrace and Lemnos, which were renowned through the whole period of pagan antiquity. Though they were only less august than the Eleusinian, nothing is certain concerning them, and even the names of the divinities are known to us only by the profanation of Mnaseas. (See CABIRI.) The Eleusinian were the most venerable of the mysteries. "Happy," says Pindar, "is he who has beheld them, and descends beneath the hollow earth; he knows the end, he knows the divine origin of life."

They comprised a long series of ceremonies, concluding with complete initiation or perfection. The fundamental legend on which the ritual seems to have been based was the search of the goddess Demeter or Ceres for her daughter Proserpine, her sorrows and her joys, her descent into Hades, and her return into the realm of light. The rites were thought to prefigure the scenes of a future life. The same symbol was the foundation of the Thesmophoria, which were celebrated exclusively by married women, rendering it probable that initiation into it was designed to protect against the dangers of childbirth. The Orphic and Dionysiac mysteries seem to have designed a reformation of the popular religion. Founded upon the worship of the Thracian Dionysus or Bacchus, they tended to ascetic rather than orgiastic practices. Other mysteries were those of Zeus or Jupiter in Crete, of Hera or Juno in Argolis, of Athena or Minerva in Athens, of Artemis or Diana in Arcadia, of Hecate in Ægina, and of Rhea in Phrygia. The worship of the last under different names prevailed in divers forms and places in Greece and the East, and was associated with the orgiastic rites of the Corybantes.—More important were the Persian mysteries of Mithra, which appeared in Rome about the beginning of the 2d Christian century. They were propagated by Chaldean and Syrian priests. The austerity of the doctrine, the real perils of initiation which neophytes were obliged to encounter, the title of soldier of Mithra which was bestowed upon them, and the crowns which were offered to them after the combats preceding every grade of advancement, were among the peculiarities which gave to these rites a military and bellicose character; and Roman soldiers eagerly sought initiation into them. The fundamental dogma of the Mithraic doctrine was the transmigration of souls under the influence of the seven planets, over whose operations Mithra presided. The whole fraternity of the initiated was divided into seven classes or grades, which were named successively soldiers, lions, hyænas, &c., after animals sacred to Mithra. The sacrifice of the bull was characteristic of his worship. On the monuments which have been found in Italy, the Tyrol, and other parts of Europe, inscribed *Deo Mithræ Soli Inviscto*, Mithra is usually represented as a young man in a flowing robe, surrounded with mystical figures, seated on a bull, which he is pressing down, or into which he is plunging the sacrificial knife. A dog, a serpent, a scorpion, and a lion are arranged near him. Nothing is certain concerning the signification of this scene. After the adoption of some of the ideas connected with other religious systems, as those of the Alexandrian Serapis, the Syrian Baal, and the Greek Apollo, the Mithra worship disappeared in the 5th or 6th century.—See Creuzer, *Symbolik und Mythologie* (1810-'12), translated into French with elaborate annotations by Guigniaut and others

(1825-'36); Sainte-Croix, *Recherches historiques et critiques sur les mystères du paganisme*, edited by Sylvestre de Saoy (1817); Seel, *Die Mithra-Geheimnisse während der vor- und urchristlichen Zeit* (1823); Limbourg-Brouwer, *Histoire de la civilisation morale et religieuse des Grecs* (1833-'41); Lajard, *Recherches sur le culte public et les mystères de Mithra* (1847-'8); Maury, *Histoire des religions de la Grèce antique* (1857); and Preller, *Römische Mythologie* (2d ed., 1865), and *Griechische Mythologie* (3d ed., 1872).

MYSTERIES, mediæval dramas. See **MIRACLES** and **MORALITIES**.

MYTHOLOGY (Gr. *mýthos*, a saying, and *lógos*, discourse), the science of myths. The ancient Greeks applied the term *mýthoi* to all classes of narratives, but especially to their religious and poetic traditions of gods, heroes, and remarkable events, and hence *μυθολογία*, mythology, came to be a synonyme of *ἀρχαιολογία*, archæology. Though mythology is still understood to embrace all the traditions and legends of a people, especially of ancient peoples, yet it is more commonly confined to accounts of and researches into primitive polytheistic religions. There are myths of all nations, and among uncivilized races they are still current and in course of formation. Max Müller's recent work on comparative religion and mythology ("Introduction to the Science of Religion," London, 1873), with an essay on the philosophy of mythology, is the first successful attempt at laying before the English public the results of the speculations of German scholars on this subject. German literature has of late produced an extensive array of works which undertake to describe the probable processes of the evolution of mythology, or religion, or moral and religious sentiments in general. Such are Caspari's *Urgeschichte der Menschheit* (Leipsic, 1873), Hellwald's *Culturgeschichte in ihrer natürlichen Entwicklung* (Augsburg, 1874 et seq.), and Peschel's *Völkerkunde* (Leipsic, 1874). Max Müller says: "There is this common feature in all who have thought or written on mythology, that they look upon it as something which, whatever it may mean, does certainly not mean what it seems to mean; as something that requires an explanation, whether it be a system of religion, or a phase in the development of the human mind, or an inevitable catastrophe in the life of language." According to some, mythology is history changed into fable; according to others, fable changed into history. Some discover in it the precepts of moral philosophy enunciated in the poetical language of antiquity; others, a picture of the great forms and forces of nature, particularly the sun, the moon, and the stars, the changes of day and night, the succession of the seasons, and the return of the years. According to this last theory, to understand the origin and significance of myths, one must enter into the childlike spirit of those who conceived them. Man instinctively turns to the light. In the

second half of the day he sees the sun gradually sink and disappear, and feels the pleasant warmth depart. His own body loses strength, and sleep overpowers him. At his waking he sees the light gradually return, the sun rise, the plants revive, and the animals come forth from their retreats. He perceives his powerlessness in these ever-recurring scenes, and he conceives a fear for the invisible forces which every day rob him of light, warmth, and life. Summer is followed by winter, and darkness and cold seem to gain daily in strength. Then comes spring; the powers of light and warmth regain the ascendant, and everything is rejuvenated and renewed. In tropical climes this change of season is ushered in by dreadful thunder storms and great floods of rain. Primitive races, the children of humanity, do not know what causes the warring of the elements. To explain it, they have to draw upon their imagination, and to believe what their fancy can supply. They consider themselves to be the centre of a great contest between beings who hate or love them, persecute or shield them. They give to these beings forms with which they are acquainted, and conceive them either as men or as animals. The earth is peopled from above, and hence there are in the heavens beings like those here below. As the chief interest of the transmundane powers rests in man, the good and evil spirits are often in the midst of human habitations. They are difficult to distinguish from ordinary men and animals, but as they must be adored or propitiated, it is to be presumed that they bear some distinctive sign by which man may recognize them. Though it is possible thus plausibly to elaborate theories of the origin of myths, the earliest records of ancient peoples exhibit mythological conceptions far beyond these primitive ideas. Even Egyptian inscriptions, of which some are perhaps from 5,000 to 7,000 years old, bear witness to the existence of an already highly developed mythological system, unfolded by some sacerdotal class.—The inhabitants of Lower Egypt differed in religious ideas and practices from those of the upper Nile. At Memphis Ptah was the object of the highest adoration. He is the father of the god of the sun, and presumably the ruler of the region of light and the god of fire. He is symbolized by the *scarabæus sacer*, an insect believed to propagate without bearing. Ra was the supreme divinity at On or Heliopolis, near Memphis. Manetho names him second to Ptah. The solar disk supported by two rings is his symbol, and the male cat, the light-colored bull, and the hawk are sacred to him. He is the god of the sun, rejuvenating every morning and creating all that exists below the heavens. Eight children of Ptah were worshipped at Ashmunein or Hermopolis. They are the gods of the elements, on whom the various forms of created beings depend. Female deities were worshipped at Sais, Buto, and Bubastis. Neith, adored at Sais, is the cow which bore the sun,

the mother of the gods, who represents the creative power of nature. The goddess of Buto the Greeks compared to their own Leto, the parent of Apollo, the solar deity. Bast or Pasht, the Greek Artemis, had her temple at Bubastis. She is represented either with a solar disk on her head, or as having the head of a cat, the animal sacred to her, and the festivities connected with her worship resembled those of Venus in Greece and Rome. In Upper Egypt Amun, the Greek Ammon, or "the hidden," is the creating, sovereign god, represented by Ptah at Memphis. He is a phallic god, sitting upon a throne, and having upon his head the two plumes, symbolizing dominion over the upper and the lower country. The goddess Maut or Mut, who bears the crown of Upper Egypt, is the mother and mistress of darkness. Shu, Sos, or Sosis, the son of Amun and Maut, was worshipped principally at Thinis and Abydos, as the spirit of the air and the bearer of the heavens. Tum or Atmu represents the sun in his nocturnal course, and Mentu or Mandu the setting sun. Tum, in some respects the equal of Amun and Ptah, generated himself, and is the father of the gods. Khem, whom the Greeks likened to Pan, is a phallic god. Khnum, Num, Knu-phus, or Kneph regulates the overflowing of the Nile. The goddess Hathor received adoration both in Upper and Lower Egypt, especially at Aphroditopolis, near Memphis, and at Edfoo and Denderah. To her are consecrated mirth, orgies, and the dance. She is generally represented as holding a tambourine in her hand, but sometimes merely as a cow. The mythological conceptions in regard to Isis, Osiris, and Horus have been given at length in separate articles. Seb and Nut, the Greek Cronos and Rhea, are the spirits of the earth and the firmament. Typhon, says Plutarch, was called Set by the Egyptians; the ass was sacred to him, and his symbol is an unknown, strange-looking animal. It is remarkable that even in their higher civilization the Egyptians continued to look upon animals as incarnations or representatives of their gods. The bull represented the gods who created life; the cow, the goddesses of conception and birth; the hawk and the cat, gods of light or of the sun; the *scarabæus*, Ptah; the vulture, Nut and Isis; a sort of ibis, Thoth; and the crocodile, Seb. The priest recognized the incarnated gods among these animals by various signs, and introduced them into the temples. The holiest of the chosen animals was the bull in the temple of Ptah at Memphis. He was the famous Apis, born of a cow which conceived him by a spark from heaven, or by a moonbeam. (See APIS.) The *ardea purpurea*, a species of heron with two long plumes on its head, generally appears at the time of the overflow of the Nile, which is the fertile season in Egypt; and hence also these birds, called *bennu* by the Egyptians, were regarded as manifestations of the god of life. With this

bird are connected the well known legends of the phoenix. Herodotus says the Egyptians were the first who believed in the immortality of the soul. For the general character of their ritual, the "Book of the Dead," see EGYPT, LANGUAGE AND LITERATURE OF.—The Accadians, who inhabited the lower regions of the Tigris and Euphrates before the time of Babylonia and Assyria, divided the universe into heaven, the earth and atmosphere, and the lower regions, ruled respectively by Anu, Ea, and Mulghe, probably corresponding to the subsequent first Chaldean triad of Anu, Nua, and Bel. Ea had a consort in Daokina. Ninghe and Ninghel seem to have been chthonian goddesses. The Accadian hell seems to have borne some resemblance to the Chaldean hell. As both demons and good spirits were to be found there, it is to be supposed that it was conceived of as a general tarrying place until the coming of the day when, as they believed, all the dead would assemble and live again. In regard to the subsequent Babylonian mythology, Diodorus says there were 12 gods of the heavens, each personified by one of the signs of the zodiac and worshipped in a certain month of the year. El or Il was the highest of these gods, and Babel, meaning the gate of El, was named after him. It seems that all the gods were local, or that each city and its neighborhood was supposed to be under the special protection of a particular deity. The importance of the various gods hence depended on the political rank of their districts. The gods of the Babylonian pantheon were associated also with appropriate goddesses. It is difficult to distinguish the attributes of El from those of Bel, whose name, meaning lord, is equally applicable to all the gods. That Bel and El were distinct gods appears from inscriptions which speak of them as being both lords of Sumir and Accad. Bel was the presiding god of Nipur, and retained his position as the national god of the Chaldeans until the rise of Babylon. Anu, Bel, Hea, Sin, Shamas, Bin, and the planetary divinities Adar, Merodach, Nergal, Ishtar, and Nebo (the divinities of the planets Saturn, Jupiter, Mars, Venus, and Mercury), were the principal of the numerous gods mentioned in the inscriptions. Anu, who often has the epithet of *malik* or king, appears to have been the Anu-malik or Anamelech of the Scriptures. Hea appears as the lord of the earth and king of the rivers; and Anu and Bel formed with him at an early period a sort of triad, presiding over the other gods. The mythological ideas attached to Sin, Shamas, and Bin are clearer. Sin, the moon god, came into importance when the seat of government was removed to Ur, his special seat. He had the symbol of the new moon, and was called the eldest son of Bel. Shamas, whose sign was the circle, came into prominence with the city of Larsa. He was god of the sun and ruler of the day. Bin is spoken of as the god who thun-

ders in the midst of the heavens, in whose hand there is a flaming sword, and who is the giver of abundance and wealth.—The Himyarites of southern Arabia are said to have worshipped the sun, the moon, and minor demons. There are many indications that the Sabaeans gave to the sun a prominent place in their worship. Himyaritic inscriptions mention the name of Almakah, a moon goddess, and of Athtar, the Babylonian Ishtar. The Nabatheans are said to have worshipped the sun, and also Dusares, a god of war. The Arab tribes commonly symbolized their deities by white and black stones. The highest god of the Midianites and Amalekites, who occupied the Sinaitic peninsula and the neighboring districts, was Baal, whom also the Moabites adored. Thus the religious conceptions of the Arabs did not vary greatly from those of Babylon and Nineveh. Still more marked are the similarities between the worship of the Phœnicians (and the Canaanites in general) and that of the Chaldeans and Assyrians. But the former is more lascivious and cruel, and does not put the same emphasis on the worship of the stars. The Phœnicians ascribed the authorship of their sacred books, which were said to be of high antiquity, to Esmun, one of their gods, and a series of hierophants, including Thabion, Isiris, Sanchuniathon, and Mochus. Philo of Byblos is considered to have given a Greek translation of the books ascribed to Sanchuniathon in his history of the Phœnicians, and the extant fragments indicate that he looked upon many of the gods as deified rulers and heroes. Amplifying and correcting his account from other sources, Max Duncker concludes that El was the principal god of the Canaanites also, and that Saturn was his planet. Above him, however, was Baal-Samin, the lord of the heavens, representing probably the beneficent effects of the sun. Springs and rivers also entered into the worship of the Phœnicians, and specially sacred was the Nahr Damur, north of Sidon, the Tamyras of the Greeks. The goddess Baaltis, mentioned by Greek authors as the Derceto of Ascalon and the Atargatis of Hierapolis, and compared by them to Aphrodite Urania, resembled the Bilit or Mylitta of the Babylonians, and the Ashera of the Hebrews. She was the goddess of birth and fertility, and symbolized the beneficent effects of moisture and water. Her worship was often held at the seashore and on the banks of rivers, and her images sometimes represent her with a body merging at the waist in that of a fish. Many Phœnician colonies adored a Venus of the sea, and the goddess of Berytus was said to have come out of the sea. Dagon, the fish god of the Babylonians, was also regarded by the Phœnicians as a god of fertility, and connected with the water, though his province seems to have been the land; he was the inventor of the plough and the giver of crops. Moloch symbolized the parching heat of the sun. He was the god of fire, purifying as well as devouring. He was

the god of war, and before a battle and after a victory he received large sacrifices of human beings. It is said that he was represented as a bull, or had the head of one; and as Adar, to whom the Babylonians gave the form of a bull, was the spirit of Saturn, it is probable that Moloch also was connected with that planet. Astarte, the divinity of Sidon, who as goddess of war held a spear and was represented in Carthage as riding on a lion, bore some relation to the moon, and was called the horned Astarte (Ashteroth Karnaim in the Scriptural form), probably in reference to the horns of the moon on her head. She was the goddess of fire, and human sacrifices were made to her. She represented chastity; to serve her was to subdue all passion; and emasculation and other self-mutilations were highly pleasing to her. The attributes of both Baal and Moloch were united in Melkart, "king of the city," whom the inhabitants of Tyre considered their special patron. The Greeks called him Melicertes, and identified him with Hercules. By his great strength and power he turned evil into good, brought life out of destruction, pulled back the sun to the earth at the time of the solstices, lessened excessive heat and cold, and rectified the evil signs of the zodiac. In Phœnician legends he conquers the savage races of distant coasts, founds the ancient settlements on the Mediterranean, and plants the rocks at the strait of Gibraltar, the end of the world, as landmarks of the extent of his journeyings. As goddess of the moon Astarte was brought into connection with Melkart, the god of the sun, becoming his spouse, assuming the name of Milkath, and changing from the severe and cruel goddess of war and chastity into a gentle patron of love and fruitfulness. Under the names of Dido and Anna the two sides of her worship reappear especially in Carthage. As Dido she was the wandering goddess of the moon, parallel to Europa, and possessed the attributes of Astarte only. Melkart finding and espousing her, she changed into Anna, the graceful. In like manner Astarte became an Asherah, and Artemis or Athena an Atargatis. The people of Byblos worshipped an *addon* (lord) Tammuz, who is generally identified with the Greek Adonis. The Phœnicians combined the deities of their cities into a sort of system, forming a circle of seven gods, called Kabirim (Cabiri), the powerful or the great, and children of Sydyk, the just. Among these gods were Khusor or Vulcan, the worker of iron; the female Khusarthis, or Thuro, the law, whom the Greeks call Harmonia, and who in many respects resembles Astarte; and Baal-Melkart, the patron of Tyre. An eighth god of this series seems to have been Esmun, "the eighth," who appears as a saving and pardoning divinity, and somewhat like the Thoth of the Egyptians and Hermes of the Greeks. The images of these eight patron gods were often carved on the bows of Phœnician vessels.

Next to the Kabirim were demons, and by degrees was formed a system of divinities of three times seven, or, with Esmun, 22 gods, arranged according to the Phœnician alphabet, and often put into fanciful relations to each other.—The mythological conceptions entering into the religious systems of other races of the East will be found treated in the articles **BUDDHISM**; **INDIA**, **RELIGIONS AND RELIGIOUS LITERATURE OF**; **KORAN**; **ZEND AVESTA**; and **ZOROASTER**.—The principal divinities of the ancient Greeks and Romans are treated under their own titles; but the prominence of these in modern culture calls for a syncretical survey of the entire theogony and body of myths, and also for the characteristic features of the worship. Numerous systems of classification have been devised, but the most serviceable for ordinary purposes is a simple grouping according to the abodes and the spheres of activity attributed to the principal gods and godlike beings. The divinities of heaven are Uranus, Zeus, Hera, Helios, Selene, Eos, Iris, and Æolus; of the water, Poseidon, Amphitrite, tritons, sirens, Nereids, naiads, Scylla, and Charybdis; of the earth, Ge or Gæa and Rhea; of the fields, woods, and gardens, Demeter, Pan, Faunus, Terminus, Flora, Pomona, Pales, Vertumnus, and nymphs; of the house and domestic life, Hestia, lares, and penates; of time, the Horæ and Cronos; of the arts, trades, and sciences, Hephæstus, Athena, Apollo, Artemis, Hermes, and the muses; of love and joy, Aphrodite, Eros, the Graces, Hebe, Ganymede, Dionysus, satyrs, and Silenus; of health, Æsculapius and Hygiea; of war and peace, Ares, Bellona, Eris, and Janus; of fate, justice, and retribution, Fatum, Nemesis, Ate, Moiræ or the Fates, Themis, Erinnyes or Eumenidæ, Harpies, Thanatos, and genii; and of the lower or infernal world, Pluto, Persephone, Grææ, Gorgons, Manes, Nyx, and Hypnos. Exclusively Roman divinities among these are Janus, Faunus, Terminus, Vertumnus, Pales, Flora, genii, lares, penates, and manes. In adopting the Greek mythology the Romans transferred to it the names of their own divinities and their own legends, or gave to the Greek names a Latinized form. Thus Cronos they called Saturnus; Uranus, Cœlus; Gæa, Terra; Helios, Sol; Zeus, Jupiter; Poseidon, Neptunus; Ares, Mars; Hephæstus, Vulcanus; Hermes, Mercurius; Hera, Juno; Athena, Minerva; Artemis, Diana; Aphrodite, Venus; Eros, Amor; Hestia, Vesta; Demeter, Ceres; Dionysus, Bacchus; Persephone, Proserpina; Selene, Luna; Eos, Aurora; Hypnos, Somnus; and the Moiræ, Parcæ; and these Latin names have prevailed in modern literature. The Greeks considered their gods as possessed of human form, sometimes rather gigantic and superhuman, and of great beauty. They needed to eat and drink and sleep. They were subject to suffering, for they could be wounded, and though called blessed they were not free from sorrows and tribulations. They were holy and just, but

irascible and hard-hearted, and at times seducers of human beings. They were truly divine, for they knew no age, and were immortal. They could foretell what would befall a person; but otherwise much must have been hidden from them, for even Jupiter could be deceived, and the other gods could deceive each other. They sometimes moved among men in any form they chose, and visibly or invisibly. They could send signs and messages, such as were announced by the oracles of Dodona, Delos, and Delphi, or by the cries, chirping, eating, or flight of birds, or by thunder and lightning, or by the peculiar formation of the entrails of certain animals. They maintained their bodily and spiritual faculties in their original youth and strength by living on ambrosia and nectar. Certain animals and plants were their emblems or sacred to them. They were worshipped in images of wood, bronze, or marble, placed on hills and mountains, or in groves and forests, and generally removed from the thoroughfares of daily life. Only the lares and penates were household gods. The worship consisted in prayer, vows, or sacrifices. Prayer was commonly offered standing, the head covered, and the hands extended upward, or laid on the mouth, or touching the altars of the gods or the knees of their images. When the gods of the upper region were to be propitiated, the people dressed in white, and the ceremonial consisted partly in bathing and washing, and raising the hands toward heaven. When the divinities of the lower regions were invoked, the dress was black, the hands were pointed downward, and only black animals were sacrificed. Bloody sacrifices, which took place in the earliest times of Greek history, were resorted to only in propitiation for a whole tribe or people. They consisted sometimes of human beings, and in such cases one commonly suffered death for all; but generally they consisted of eatable domestic animals. The blood of the slaughtered animal was poured upon the altar, the portion designed for the god was burned upon it, and the remainder was distributed among the priests and sacrificers. Other sacrifices consisted mainly in libations, as wine, honey, milk, and oil, and the burning of frankincense, and fruits and sweets. The myths or mythical traditions, and the heroes or demigods who figure in them, are an important element in the mythology of the Greeks and Romans. The myths may be divided into three groups: those with one hero, those with entire generations of heroes, and those which recount tribal or national expeditions. The principal myths relating to single heroes are those of Prometheus, Deucalion, and Tantalus. Among those of heroic races or families are the Corinthian myths of Sisyphus and Bellerophon; the Argive myths of Inachus, Danaüs, Danaë, Perseus, and Hercules; the Attic myths of Cécrops and Theseus; and the Theban myths of Cadmus and Œdipus. The myths of national expeditions are the Argonau-

tic, the two Theban wars, and the Trojan war. The myths of Evander, Æneas, and Romulus are Roman. The heroes or demigods were of both divine and human descent, or rather human beings elevated to the rank and honor of gods. The masses generally looked upon them as having been the great men of primitive times, and paid homage to them only as such. In order to facilitate the understanding of the great deeds which the myths ascribed to them, they were imagined as having been persons of superhuman strength. They all differ from the gods in that they were mortal, though a few were permitted to continue for a while their existence in Elysium. Hercules is the only one who becomes immortal. The worship of heroes consisted in offerings of honey, wine, oil, and milk. Animals also were sacrificed to them, but with the caution of twisting the heads downward, and making the blood flow into a ditch. Further, the meat was not eaten, but burned; and only the tombs of the heroes could be used for their worship.—The mythology of the Scandinavian or Norse races, preserved mainly in the literature of Iceland, accounts for the existence of the world by placing in the beginning a Ginungagap, an empty space, with a Nifheim, a region of mist, ice, and snow, to the north, and a Muspelheim, a region of warmth and sunlight, to the south. The ice melting and dropping into Ginungagap, there came to be an accumulation of matter, out of which arose Ymir, the giant, who brought forth Reimthursen, the frost. His nurse was Audhumla, the cow, which lived by licking the ice, and in consequence of her licking appeared the form of Buri, the father of Burr, the father of Odin. Vili and Ve, Odin's brothers, overthrew the dynasty of Ymir and Reimthursen. Ymir's flesh, blood, and bones became the earth, sea, and mountains, and his skull and brains the heavens and the clouds. In Jötunheim were the giants, and Ymir's eyebrows served as a wall between them and the inhabitants of the earth. The clouds and the wind were subject to Odin, the god of war, and the father of Saga, the goddess of poetry. On his shoulders sat the ravens Herginn and Muninn, which he sent out to bring him news of passing events. At his side sat Frigga, his favorite, who controls all nature. Freyja, the custodian of the dead, claimed half the heroes slain in battle. Both were also goddesses of love, and at different times the one or the other was considered the wife of Odin. Thor, Odin's son, the god of thunder and lightning, held a hammer as a symbol of his authority, and threw down from his abode in heaven thunderbolts made by the black elves that dwelt in the interior of the earth. He presided also over the domestic hearth and the fruitfulness of wedlock. Baldur or Baldr, the sun, the father of daylight, had been made invulnerable except by the mistletoe, and Loki, son of the giant Farbauti and

god of mischief, ordered Hodr, the blind god of winter, to slay Baldur with a twig of it. Loki thought to escape by plunging into the sea and changing into a salmon, but was caught in a net, and bound till the judgment day. Hodr was killed by Bali, Odin's son. The wolf Fenris, the progeny of Loki, bit off the hand of Tyr, the god of war and athletic sports, and was also bound, and on the judgment day he will be slain by Vidarr, the god of twilight, next in strength to Thor. The serpent of Midgard (which is the middle world, between Muspelheim and Niflheim, and formed from Ymir's body) was thrown by Odin into the sea, where it grew so large as to encircle the whole world; as was also Hel, a goddess half black and half blue, who lived upon the brains and marrow of men. On Midgard was Asgard, the dwelling of the Asa race, namely, Odin and the twelve Æsir: Thor, Baldur, Freyr, Tyr, Bragi, Hodr, Heimdalr, Vidar, Vali, Ullr, Ve, and Forseti. The gods and goddesses lived apart, the former in the mansion called Gladsheim and the latter in Vingolf. In Valhalla Odin caroused with dead heroes, and was waited upon by Oskmeyjar or Valkyries. Freyr, whose attributes are not clearly defined, is called by Dasent the god of rain, sunshine, and fruits, whom Gridr captivated with her beauty. Iduna, the wife of Bragi, the god of poetry and eloquence, dwelt in the lower world, where she was custodian of the golden apples with which the gods rejuvenated themselves. Ullr was god of the chase, and Mimir of wisdom and knowledge. Heimdalr is the watchman of the bridge Bifrasta, that leads to the lower world, and his horn will give the signal for the great battle of the gods at the end of time. In the article EDDA are some additional details of the mythological conceptions of the Scandinavians.—The mythology of the Germans is built upon the same foundation as that of the Scandinavians, and many portions of it are identical. The principal deities are the same. Wuotan, or Wotan according to the Low Germans, is the Odin of the North. The atmosphere and the heavens are subject to him, and on him depends the fruitfulness of the earth. He takes pleasure in the brunt of battle and in the excitement of the chase. He rides upon a white horse, and his gigantic form is robed in a large dark mantle. Donar, the Scandinavian Thor, the god of storms, swings a heavy hammer or a thunderbolt. He is the giver of increase, and the fruits of the field, the cattle, and wedlock are under his protection. The Tyr of the Norse finds a counterpart in the Tui or Saxnot of the Saxons, the Ziu of the Swabians, and the Eru of the Bavarians. His symbol is the sword; he is the god of war, but originally he was a god of heaven. Fro, who seems to have answered to Freyr, unites various not well defined mythological attributes. Baldur or Phol, who was principally worshipped in Thuringia, is a youthful warrior, and somewhat connected with the blessings of the season of spring. The Frisians

gave him a son named Fosite, the Forseti of Norse mythology. The goddess called Nerthus by Tacitus, which name was subsequently corrupted into Hertha, whom the Franks worshipped as Holda or Holle, the Bavarians as Perchta, and the Low Germans as Fria or Frigg, appears to have been known first to the early inhabitants of the island of Rügen in the Baltic. Her attributes are those of kindness and motherly care. She presides over the blessings of wedded life, house, and field, and rules the land of the dead. For the minor deities of the Germanic races, rather of a legendary than of a mythical character, see FAIRIES. See also DEMONOLOGY.—See Creuzer, *Symbolik und Mythologie der alten Völker* (3d ed., Leipsic, 1837-'44); Keightley, "Mythology of Ancient Greece and Italy" (2d ed., London, 1865); Preller, *Römische Mythologie* (2d ed. by Köhler, Berlin, 1865); Leitschuh, *Die Entstehung der Mythologie und die Entwicklung der griechischen Religion* (Würzburg, 1867); Baring-Gould, "Origin and Development of Religious Belief" (London, 1869-'70); George W. Cox, "The Mythology of the Aryan Nations" (London, 1870); Schömann, *Griechische Alterthümer* (3d ed., Berlin, 1871-'3); Preller, *Griechische Mythologie* (3d ed. by Plew, Berlin, 1872 *et seq.*); Kirchner, *Grundrisse der Mythologie und Sagen Geschichte der Griechen und Römer* (Gera, 1872); Gubernatis, "Zoological Mythology" (London, 1873); Murray, "Manual of Mythology" (London, 1873); Petiscus, *Der Olymp, oder Mythologie der Griechen und Römer* (Leipsic, 1873); Delaunay, *Moines et Sibylles dans l'antiquité judéo-grecque* (Paris, 1874); Kroon, *Mythologisch woordenboek* (Arnheim, 1874 *et seq.*); Holtzmann, *Deutsche Mythologie* (Leipsic, 1874); Lenormant, *La magie chez les Chaldéens* (Paris, 1874); Schrader, *Ishtar* (Berlin, 1874); "Records of the Past: Translations of Assyrian and Egyptian Monuments" (London, 1874 *et seq.*); and Duncker, *Geschichte des Alterthums* (4th ed., Leipsic, 1874).

MYTILENE, or *Mitylene* (anc. *Lesbos*), an island of the Grecian archipelago, belonging to Turkey, separated from the coast of Asia Minor by a strait from 7 to 10 m. broad; area, 276 sq. m.; pop. previous to the Greek revolution, 60,000, since reduced to less than 40,000. On the south it is indented by two deep bays called Ports Caloni and Iero, the former extending to the centre of the island. Both have very narrow mouths, and expand as they stretch inland. The surface is diversified by wooded hills and beautiful plains; the soil is fruitful, and the climate salubrious, but the means of irrigation are imperfect. The principal products are olives, wine, fruit, silk, cotton, and pitch. The chief town is Castro, or Mitylene, on the E. coast, which receives considerable business as a port on the steamboat route to Constantinople. The principal merchants are Greeks. The town was considerably damaged by an earthquake in 1867.—The ancient Lesbos

was one of the islands of the Æolians, and at a very early period contained several rich and populous cities, of which Mytilene and Methymna were the most important, on account of their fine harbors for the coasting trade. After the island had undergone several revolutionary changes, Pittacus about 600 B. C. usurped the dictatorship, restored order, and laid the foundation for the future greatness of the city of Mytilene. While continental Æolis became

subject to Persia about 550 B. C., Lesbos maintained her independence several years longer. About 500 it joined the revolt of the Ionians, but without success. After regaining its independence it became a member of the Athenian confederacy in 477, but revolted in the beginning of the Peloponnesian war, 428, and once more in 412, both times suffering severely. With the exception of a short period during which it was under Spartan sway, Lesbos con-

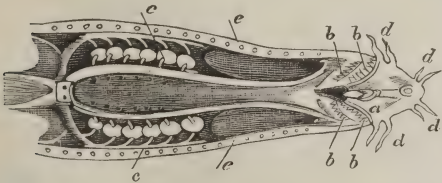


Mytilene.

tinued subject to Athens till 387. In 334 it submitted to Alexander. In the 1st century B. C. the island was under the dominion of Mithridates, and after his defeat it was annexed to the possessions of Rome. In the 13th century one of the Byzantine emperors ceded it to the Venetian family of Gateluzzi as the dowry of his sister; it was taken from them in 1462 by Mohammed II., who besieged the chief city and captured it through treachery. It was the birthplace of the poets Terpaner, Arion, Alcæus, and Sappho, of the philosophers Pittacus, Cratippus, and Theophrastus, and the historians Hellanicus and Theophanes.

MYXINIDS, an order of fishes, which, with the cyclostomes or lampreys, form the class of myzonts of Agassiz, containing the lowest of the vertebrates. They form the family *hyperotreta* (Müll.; *marsipobranhii* of Huxley),

perforated, and the cavities of the nose and mouth communicate (as in no other fish); the upper margin of the mouth has a single tooth, and the tongue has a double recurved row on each side; the jaws are absent, and the inferior margin of the mouth is formed by the anterior extremity of the tongue bone; the eyes are concealed; the branchiæ are on each side, with internal ducts leading to the œsophagus. For full details see the papers of J. Müller in the "Transactions of the Berlin Academy" for 1834, 1838, 1839, and 1842, and papers by F. W. Putnam in "Proceedings of the Boston Society of Natural History," vol. xvi., 1874. In the genus *myxine* (Linn.) two spiracles approximate on the lower surface behind the branchiæ, each receiving the external ducts of the six branchiæ of its own side. The common myxine or glutinous hag (*M. glutinosa*, Linn.) has a smooth eel-like body, with a very



Organs of Respiration in the Myxine: *a*, single hooked tooth; *b b b b*, double rows of lingual teeth; *c*, branchial cells; *d d d d*, tentacula; *e*, mucous glands.

and are characterized by a cylindrical body, obliquely truncated anteriorly; the mouth is furnished with cirri or tentacles, the palate is

Common Myxine (*Myxine glutinosa*).

long dorsal fin continued round the tail to the vent, a single spiracle on the head, and eight barbules around the mouth; the color is bluish

brown above and whitish below; the length is from 6 to 15 in. Linnæus placed this animal among worms, regarding the two lateral parts of the tongue as transverse jaws, which do not occur in vertebrates. It is the lowest of vertebrates, except the lancelet. The specific name is derived from the great quantity of viscid mucus secreted by the cutaneous glands whose pores open along the under surface of the body; the spinal column is a soft and flexible cartilaginous tube, with no division into rudimentary vertebrae. It is called borer from its habit of eating into the bodies of other fish which have been caught on hooks, entering the mouth or other part of the surface, and in this way is often annoying to fishermen during spring and summer. It is found along the

coasts of Great Britain and in the northern seas, on the N. E. coast of North America, and the S. coast of South America. In the genus *heptatrema* (Dum.) or *bdellostoma* (Müll.) there are six or seven branchiæ on each side, each with an external spiracle; the eyes are very small, conspicuous through the skin. It resembles the preceding genus in internal structure, and attains a larger size; it is found in the southern seas, preferring rocky bottoms, where it lies in wait for fishes; it is active, and has remarkable powers of emitting mucus from the skin. The species described as *bdellostoma Forsteri* by Müller and as *B. cirrhatum* by Günther is roasted and eaten by the natives of New Zealand.

MYZONTS. See MYXINOIDS.

N

N, THE 14th letter and the 11th consonant of the English alphabet, corresponding to the 14th letter of the Phœnician alphabet, the *nun*, the name of which in the Semitic languages signifies fish. The usual sound of the English N, or that which it naturally has when not affected by the neighboring consonants, is that of a lingual nasal. This is in the English language an original sound, derived without change from the earlier languages. There is an epenthetic *n* in *bring* (comp. *brought*), *think* (comp. *thought*); also in some words of Latin origin, as *frangible* (comp. *fracture*), *tangent* (comp. *tact*). The letter *n* final, after *l* or *m*, is silent in English, as *condemn*, *kiln*, *column*, *hymn*; but this *n* was originally sounded. The omission of an *n* is sometimes indicated merely by the lengthening of the preceding vowel, as *goose* (Ger. *Gans*), *tooth* (Lat. *dens*, genit. *dentis*; Mæso-Gothic, *tunthus*), *tithe* (comp. *tenth*). The English *n*, when it comes immediately before a palatal mute, as *c*, *ch* (when pronounced like *k*), *g*, *k*, *q*, or *x*, is a palatal nasal, or has the sound of *ng* final. In *ng* final, the palatal sound has arisen in the same way, although the sound of *g* has been dropped in English. But the suffix *ing* appears to have arisen from the infinitive termination *an* in the earlier language. The Anglo-Saxon and Latin have the same two nasal sounds of *n* as the English. The Mæso-Gothic and the Greek have the two nasal sounds, but express the palatal nasal by *g*. The Latin of the earliest authors had sometimes *g* and sometimes *n* for the palatal nasal. The Sanskrit language has a great variety of *n* sounds.—In numeration, the Greek N signified 50. Among the Romans, according to some authors, N signified 90; according to others 900, and with a horizontal line above it, 90,000.

NABATHEANS. See Edom.

NABIS, a Spartan tyrant who raised himself to supreme power on the death of Machanidas

in 207 B. C. He caused the young son of the deceased king Lycurgus to be assassinated; the most influential citizens were put to death or banished; the wealthy were subjected to incessant exactions enforced by torture, and one of the tyrant's favorite engines of punishment was the figure of a woman which he called after his wife Apega, and which being made to embrace the victim pierced him with spikes projecting from its breast and arms. The money thus obtained enabled him to support a mercenary force to crush the spirit of Sparta, attempt the restoration of the Lacedæmonian ascendancy in the Peloponnesus, and seize the city of Messene. He was forced to withdraw by the Megalopolitan general Philopoemen, but in the next year he returned and reduced the territory of Megalopolis to great distress. On the conclusion of the first Macedonian war, Flamininus, the Roman consul, invaded Laconia with a powerful force, and laid siege to Sparta. Nabis made an obstinate defence, but was ultimately constrained to purchase peace (195). In 192, having again involved himself in hostilities with the Achæans, he applied to the Ætolians for succor. They sent a small force, ostensibly to assist but in reality to overthrow him, and he was soon assassinated by their general Alexamenus.

NABLUS, or *Nabulus*, a town of Palestine, 30 m. N. of Jerusalem; pop. estimated at from 10,000 to 20,000, among whom are about 1,000 Christians and 200 Samaritans. It is situated in a valley at the base of Mt. Gerizim, and is supposed to occupy the site of the ancient Shechem. When restored by the Romans in the reign of Vespasian, it received the name of Neapolis, of which its modern name is a corruption. In the Samaritan synagogue are several valuable manuscripts, the most important of which is the copy of the Pentateuch known as the Samaritan codex. Nablus has important manufactures, especially of soap.

NABOB (Hind. *nawāub*), a title of office in India, applied during the Mogul empire to the imperial lieutenant or viceroy of a province. The word is the plural of *naib*, prince, it being a custom of the natives to address all great men in the plural number. As the power of the emperors declined, their deputies became independent. They made war upon each other, and the country was perpetually disturbed by their contentions. The English, availing themselves of these dissensions, reduced them in detail to mere pensioners on their bounty.—In the English language the word nabob signifies a man who has acquired great wealth in the East.

NACHTIGAL, Gustav, a German traveller, born at Eichstedt, Prussian Saxony, Feb. 23, 1834. He practised medicine in Algeria from 1859 to 1863, when he entered the service of the bey of Tunis as a military doctor, and eventually became his body physician. In 1869 he volunteered to accompany a caravan to Kuka, to convey presents from the king of Prussia to the sheikh of Bornoo in return for his kindness to various German travellers. He left Tripoli Feb. 18, 1869, and reached Moorzook March 27. While the expedition was delayed he explored Tibesti, the country of the Tibboos, and finally left Moorzook April 18, 1870, reaching Kuka July 6. He collected geographical materials about Bornoo, visited Kanem and Lake Tchad, acquiring much valuable information concerning the southern Sahara, and went to Baghirmi, where he explored the Shari and its many branches, returning several times to Kuka. In the beginning of March, 1873, he set out on his return through Waday, passing S. of Lake Tchad to Abeshir, the present capital of Waday. While there he visited Dar Runga, a vassal state, which stretches southward to about lat. 8° N. He arrived at the capital of Darfoor on March 17, 1874, and reached Cairo in November, no European having ever before succeeded in making the journey through from Waday. Petermann published in 1874 his *Die tributären Heidenländer Baghirmis*. For an account of his late explorations see the London "Geographical Magazine" for October, 1874.

NACOGDOCHES, an E. county of Texas, bounded S. W. by the Angelina river and E. by the Attoyac, which unite at the S. E. corner; area, 886 sq. m.; pop. in 1870, 9,614, of whom 3,275 were colored. It has an undulating surface, occasionally hilly and broken, and generally well timbered. The soil varies greatly, but is mostly fertile, cotton and corn being the principal crops. Good iron ore exists. The chief productions in 1870 were 217,861 bushels of Indian corn, 16,515 of barley, 35,113 of sweet potatoes, 4,531 bales of cotton, 62,334 lbs. of butter, and 5,490 gallons of sorghum molasses. There were 1,971 horses, 3,607 milch cows, 9,563 other cattle, 2,470 sheep, and 16,089 swine. Capital, Nacogdoches.

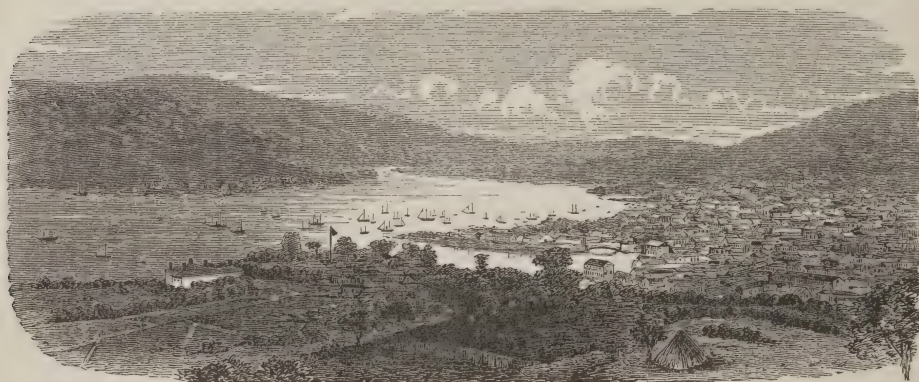
NADIR SHAH, or **Kuli Khan**, a king of Persia, born in Khorasan in 1688, assassinated June 19

or 20, 1747. His father was a maker of sheep-skin caps and coats. For four years Nadir was held in captivity by the Uzbecks, from which at the age of 21 he escaped, and afterward entered the service of the governor of Khorasan. Here he attained high rank, but was degraded and punished, whereupon he placed himself at the head of a band of robbers. The invading Afghans had dethroned the Persian monarch early in the 18th century. Nadir joined Tamasp, son of the shah, with 5,000 men, in 1727, was given the supreme command, drove the Afghan king out of Khorasan, overtook the retreating army at Persepolis, and cut it to pieces. For these services he received in 1730 the provinces of Khorasan, Mazanderan, Seistan, and Kerman, and took the title of Tamasp Kuli (Tamasp's slave), to which Khan was added by the king. In 1731 he defeated the Turks on the plains of Hamadan, and then marched against the Afghans. In his absence Tamasp was defeated by the Turks and signed a treaty ceding them several provinces. Nadir, taking advantage of the popular discontent, proclaimed that he would carry on the war, and in August, 1732, dethroned the sovereign, who was afterward put to death. The infant son of Tamasp was made nominal ruler as Abbas III., but died early in 1736; and at an assembly called to consider the state of the kingdom, Nadir accepted the crown. He had already recovered from the Turks the ceded provinces, and he now moved against the Afghans. He captured the city of Candahar in 1738, and his son Riza Kuli crossed the Oxus and overthrew the ruler of Bokhara and the Uzbecks. Afghanistan was conquered, and Nadir, marching into Hindostan in 1739, defeated the Mogul army, and entered Delhi. The inhabitants of that city rose against their conquerors, and Nadir thereupon ordered a general massacre of Hindoos in every house in which a dead Persian was found. He returned to Persia with plunder amounting to \$100,000,000, including the Koh-i-noor diamond, having also taken from the Mogul emperor the provinces west of the Indus. In 1740 he subjugated the sovereign of Bokhara, and defeated and put to death the khan of Khiva. In his latter years he became capricious and cruel, finally putting whole cities to the sword on the slightest pretext. He had also grown so avaricious that the taxes levied upon the empire were intolerable. At length four noblemen, who learned that their names were in a proscribed list, broke into his tent at night and despatched him. His life was written in Persian by Mirza Mohammed Mahadi Khan, his secretary, and translated into French by Sir W. Jones (London, 1770; English, 1773). A detailed account of his career is given by Malcolm in the second volume of the "History of Persia" (1815), and of his earlier life and conquests by Fraser, whose authorities were Persian manuscripts, in his "History of Nadir Shah" (1742).

NÆVIUS, Cneius, a Roman poet, born probably in Campania between 274 and 264 B. C., died in Utica, Africa, about 204. He served in the first Punic war, settled in Rome, and produced his earliest play in 235, making the stage a vehicle for assailing the aristocracy. For a libel on Q. Cæcilius Metellus he was cast into prison, and obtained his release by two plays, the *Harjolus* and *Leon*, in which he recanted his calumnies. Having again offended, he went into exile at Utica, and employed his latter days upon his epic poem on the "Punic War," a few fragments of which are extant. Fragments of Nævius may be found in several collections of the Latin poets, and in Hermann's *Elementa Doctrinæ Metricæ* (Leipsic, 1852); the most complete and convenient edition is that of Klussmann (Jena, 1843).

NAGASAKI (*i. e.*, Long Cape), a seaport town of Japan, in the province of Hizen, in the west of the island of Kiushiu, the seat of government of the *ken* or prefecture of the same name; pop. about 80,000. The city is sur-

rounded by hills on every side except toward the harbor. It is laid out in rectangles, and a stream of water crossed by 21 bridges flows through it. The hills are covered with temples and groves. The foreign concession is separated from the native town by an arm of the bay. The historic isle of Deshima (outer isle) lies in front of the native town, shaped like an open fan, the handle toward the shore. The harbor is landlocked, deep, spacious, and one of the finest in the world. The surrounding scenery is of exquisite beauty. The city contains a Chinese quarter, in which live nearly 1,000 Chinamen, who carry on a large trade with their own country in medicines, dried fish, isinglass, seaweed, and mushrooms. The exports to Europe and America are tea, tobacco, coal, camphor, and porcelain. Nagasaki is the terminus of two telegraph cables, one to Shanghai, the other to Vladivostok; it is also connected by telegraph with Tokio and Hakodate. It contains a government hospital and college, a patent slip, and dry dock. The sur-



Nagasaki.

rounding country is rich in metallic wealth, and its vicinity to the collieries of Takashima, Karatsu, and Matsushima makes it a good coaling station for the many steamers that ply in the Inland sea and Pacific ocean. It is the chief depot of the trade with China, and the mart for the potteries of Hizen; but the lack of good land approaches hinders its growth. The value of the exports in 1873 was \$1,899,793, and of the imports \$1,626,775, carried in 328 vessels, of 280,972 tons.—Until 1568 Nagasaki was a mere fishing village. The daimio of Omura invited the Portuguese merchants and missionaries to reside here, and conversions and trade multiplied until the village grew into a large city. During the 100 years of Jesuit proselytizing in Japan Nagasaki was the ecclesiastical centre of the new faith, and the annals of missionary zeal, persecution, and massacre have given it great historical prominence. After the expulsion of the Portuguese, the Dutch were ordered to leave their factory at Hirado, and come to Deshima, in which they

lived under surveillance, only one Dutch ship being allowed to come annually to Nagasaki for more than two centuries. In 1854, by the Perry treaty, the harbor was specified as a place of anchorage and supplies for foreign vessels. By the Harris treaty it was opened to foreign commerce. Although S. of the usual course of the typhoons which ravage the coasts of Japan, a cyclone of unusual violence visited Nagasaki in August, 1874, sinking more than 100 junks, damaging steamers, and causing great destruction of life and property in the city. Pappenberg, the precipitous rocky island from which thousands of the native Christians were driven into the sea in 1643, lies in the bay in sight of the city.

NAGOYA, the fourth largest city of Japan, on the main island, in the province of Owari, capital of the Aichi *ken* or prefecture, near the head of Owari bay, about 170 m. W. S. W. of Tokio; pop. about 400,000. The city lies on the great plain of Owari, forming nearly a right-angled triangle, with the river which

drains the castle moats as one of the sides. It is regularly laid out in squares, and the commercial, ecclesiastical, and official quarters are separate. The castle, now containing the government buildings, is one of the largest and strongest in Japan. The temples and monasteries are numerous, wealthy, and occupy much ground. The Tokaido, or main highway of the empire, passes through the city, which has a large inland trade, chiefly by carts and pack horses, and a still larger business by junks and steamers. It is noted for its manufactures of decorated porcelain, lacquered work, wood carving, and fans. It contains a telegraph station and a government college. Seven miles distant is the seaport of Miya.

NAGPORE, or **Nagpoor**, a city of central India, capital of the province of Berar or Nagpore, situated in lat. $21^{\circ} 9' N.$, lon. $79^{\circ} 11' E.$, 420 m. E. N. E. of Bombay, with which city it is connected by a branch of the Great Indian Peninsula railway; pop. about 115,000. It is 7 m. in circumference, but the houses are generally inferior. There are important manufactures of cotton, and silk and cutlery are also made. Two great trunk roads in addition to the railway lead out of Nagpore: one 160 m. to Jubbulpore, the other 180 m. to Raipur in Chaltisghar.—In 1740 Nagpore became the seat of an independent Mahratta sovereignty. On Nov. 26, 1816, the English garrison of 1,400 men were suddenly attacked at Seetabuldee, the heights in the vicinity of the residency, by the rajah's army of 18,000 troops, who were finally repulsed, although with a loss to the British of 333 killed and wounded. The city was annexed to the British dominions with the state of Berar in 1853. A partial mutiny of the Madras sepoy's stationed at Nagpore, on Jan. 18, 1858, was successfully repressed.

NAHANT, a town of Essex co., Massachusetts, 10 m. N. E. of Boston by water; pop. in 1870, 475. It consists of a peninsula, projecting about $3\frac{1}{2}$ m. into Massachusetts bay, and connected with Lynn by a narrow beach of sand and gravel so hard that a horse's footsteps scarcely leave a trace. The extremity, called Great Nahant, is 2 m. long and $\frac{1}{2}$ m. broad, and contains 463 acres. In many places the shore is lined by rocks rising 20 to 60 ft. above the tide; and there are many singular caves and fissures, the most noted of which are the Swallow's cave and the Spouting Horn. A large hotel, erected on the E. extremity in 1824, was burned in 1858, and there are now only three small hotels. The peninsula is chiefly occupied by handsome cottages, used as summer residences by the citizens of Boston. Malis garden, a public picnic ground, occupies about 20 acres along the shore on the N. side, and is adorned with fountains and shell work. Between Great Nahant and the mainland, and about $\frac{1}{2}$ m. from the former, a rocky ridge, called Little Nahant, crosses the beach, rising 80 ft. above the sea, and comprising about 40 acres. A mile E. of Nahant is Egg Rock,

rising abruptly to the height of 86 ft., and crowned by a lighthouse. The town was separated from Lynn in 1853.

NAHE, a river of Germany, one of the affluents of the Rhine. It rises on the confines of Rhenish Prussia and the detached portion of Oldenburg enclosed by that province, and after a tortuous course, first N. E. and then E., of about 60 m., 25 m. of which is navigable, it empties through a portal formed by the Rochusberg on the right and the Rupertsberg on the left into the Rhine at Bingen. There is some fine scenery in the vicinity of Creuznach and Oberstein.

NAHUM, the seventh of the Hebrew minor prophets in order of arrangement. He is designated the Elkoshite, probably from the place of his birth, the location of which is however unknown, contradictory traditions placing it in Galilee and on the banks of the Tigris. He prophesied probably in Judah toward the close of the reign of Hezekiah (about 700 B. C.), after the deportation of the ten tribes, and predicted the destruction of Nineveh and the relief of Judah. His pictures of the wickedness and fall of Nineveh are vivid and powerful, and his diction clear and sonorous. Recent explorations in the East have given fresh interest to the study of this book. There are many commentaries upon it and works illustrating its connections with history. See especially O. Strauss, *Nahumi de Nino Vaticinium* (1853); M. von Niebuhr, *Geschichte Assur's und Babel's* (1857); Vance Smith, "The Prophecies relating to Nineveh" (1857); and Paul Kleinert in Lange's *Bibelwerk*, part xix. (1868).

NAIADS (Gr. *ναιεω*, to swim), in Grecian and Roman mythology, nymphs who presided over fresh waters, and were supposed to inspire those who drank of them with oracular powers and the gift of poetry. They could also restore sick persons to health. They are represented in works of art as beautiful maidens, half draped, and with long hair.

NAIL (Sax. *nægel*; Ger. *Nagel*), a piece of metal, more or less sharp at one end with a head at the other, used to fasten together pieces of wood or other material by being driven into or through them. The principal division is into wrought and cut nails, the former being made from tough wrought iron, the latter from rolled plates. The different sorts are named from the use to which they are applied or from their shape, as shingle, floor, or horse-shoe nails, tacks, brads, or spikes. The term penny, when used to mark the size of nails, is supposed to be a corruption of pound. Thus, a four-penny nail was such that 1,000 of them weighed 4 lbs., a ten-penny such that 1,000 weighed 10 lbs. Originally, the "hundred" when applied to nails was 6 score or 120; consequently the thousand was 1,200.—The making of nails is one of the oldest of the handicraft arts, probably dating as far back as the art of working metals. Before the invention of machinery an immense number of per-

sons were employed in making nails, there having been no fewer than 60,000 nailers in the neighborhood of Birmingham alone. It is only within the last 80 years that machinery has been employed to supersede to any extent hand labor in nail making. It appears, however, that as early as 1606 Sir Davis Bulmer obtained a patent for cutting nail rods by water power. The details of the invention are unknown, and there are no records of English patents prior to 1617. In 1618 a patent was issued in England to Clement Dawbeny for an improvement on Bulmer's machine. But machinery was not put into actual use in England till 1790, when Thomas Clifford of the city of Bristol patented a nail machine. His machines were used in French's factory at Wineburn, Staffordshire, in 1792. He used two iron rollers, faced with steel, in which were sunk impressions, or forms of the nails, half of the form being in each roller, and arranged circumferentially, so that a bar of iron, being passed between the rollers, came through a string of nails, the head of one nail being slightly joined to the point of the next. In the United States, where so many wooden structures had to be erected by the settlers, the obtaining of cheap nails was of the utmost importance. In 1775 Jeremiah Wilkinson of Cumberland, R. I., cut tacks from sheet iron, and afterward nails and spikes, forming the heads in a vice. The first patent issued for a machine for cutting nails is said to have been given to Josiah G. Person, or Pearson, of New York, March 23, 1794. On Jan. 16, 1795, Jacob Perkins of Boston obtained a patent for a cutting machine said to have been invented about 1790, and to have been capable of making 200,000 nails a day. The following year patents were issued to Peter Clifff and to Amos Whittemore of Massachusetts, and to Daniel French of Connecticut. It is said that the first patent for a cutting and heading machine (Nov. 11, 1796) was granted to Isaac Garretson of Pennsylvania; and on Dec. 12, 1796, a patent for a similar machine to George Chandler of Maryland. Ezekiel Reed of Bridgewater, Mass., is also said to have invented a machine for cutting and heading nails at one operation. Afterward several patents were granted to Jesse Reed, Samuel Rogers, and Melville Otis of Massachusetts, to Mark and Richard Reeve of Philadelphia, to Roswell Noble of Baltimore, and others. The machine invented by Jesse Reed, with some later improvements, is that still most largely used. The manufacture of cut nails was soon established in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, and Maryland. In 1810 Joseph C. Dyer of Boston, but then a merchant in London, took out patents in England for the nail machinery invented in Massachusetts, and large manufacturing establishments were soon put in operation. Some in the neighborhood of Birmingham are able to make over 40,000,000 nails a week. Mr.

Edward Hancorne, a nail maker of London, in 1828 obtained a patent for a nail machine, by which the nail was pointed by swedging it between two oscillating snail pieces or spirals, the rod being cut off by shears and headed by a piece working in a slide propelled by a cam attached to a shaft. In 1834 Mr. Henry Burden obtained a patent for a machine, which with several improvements has been for many years in successful operation at his extensive nail works in Troy, N. Y. Many of the first inventors spent large sums of money on their machines. It has been estimated that it cost more than \$1,000,000 to bring them to the perfection arrived at in 1810, when a machine made about 100 nails per minute. It was at this time that the full value of the invention was brought prominently before the world in the well known report of Albert Gallatin, then secretary of the treasury. Large nail factories were early established in different parts of Massachusetts, and at Ellicott's Mills, near Baltimore. At the present day the business is carried on very extensively in the Schuylkill iron region. There the pigs from the furnace go immediately to the bloomery, thence to the rolling mill, and so on through the slitting and nail-cutting machines, so that all the operations from the crude ore to the finished nail are carried on at the same place.

NAIN, a town of Palestine, in Galilee, mentioned in the New Testament (Luke vii.) as the place where Jesus raised the widow's son to life. It was situated between the Little Hermon and Mt. Tabor, about 6 m. S. E. of Nazareth, and 60 m. N. of Jerusalem. It is now an insignificant hamlet, and is called Nein. The rock near by is full of sepulchral caves.

NAIRNE, Baroness. See OLIPHANT, CAROLINA.

NAIRNSHIRE, a maritime county of Scotland, bordering on the Moray frith, Elginshire, and Inverness-shire; area, 215 sq. m.; pop. in 1871, 10,225. The coast, about 10 m. in extent, is low, sandy, and dangerous. The inland districts are hilly and wooded; those on the sea are well cultivated and productive. The chief rivers are the Nairn and Findhorn. The climate is severe but healthful. Nairn, the capital (pop. in 1871, 4,207), is a favorite watering place. About 5 m. distant are the remains of Cawdor castle, where Macbeth is said to have murdered Duncan. The room which was pointed out as the scene of the deed was destroyed by fire in 1815; but no part of the castle is really older than the 15th century.

NAJA. See COBRA DE CAPELLO.

NAKHITCHEVAN. 1. A town of European Russia, in the government of Yekaterinoslav, on the right bank of the Don, about 30 from its mouth, and 7 m. E. N. E. of Rostov; pop. in 1871, 16,584, mostly Armenians. It stands on an eminence, has manufactures of cotton and silk, and maintains an extensive traffic with Circassia, Astrakhan, Turkistan, and Constantinople, especially in pearls and precious stones. The town was founded in 1780 by a colony of

Armenians, and is the seat of the Armenian patriarch of Russia. II. A city (anc. *Naxuana*) of Russian Armenia, on a plateau near the left bank of the Aras, 83 m. S. E. of Erivan, and 175 m. S. by E. of Tiflis; pop. in 1871, 5,356. The Armenians regard it as the most ancient city in the world, and as the spot where Noah settled after the deluge; and it formerly contained, according to the Persian annalists, 40,000 houses. In antiquity it belonged to Media, and subsequently it became important in Armenia. It was destroyed in the 4th century by the Persians, in the 13th by the Tartars, and in the 17th again by the Persians. Shah Nadir wrested it from Turkey, and the Russians in 1827 from Persia. In 1840 it was partly destroyed by an earthquake.

NAMAQUA, a tribe of S. Africa, inhabiting both banks of the Orange river near the mouth. Their country is divided into Great and Little Namaqualand, and the latter, lying S. of the Orange river, is now absorbed in Cape Colony. The tribe is small, and has been much diminished by disease and famine. They dwell in huts of the old Hottentot style, and speak the Nama, the oldest and purest of the Hottentot dialects. (See **HOTTENTOTS**.)

NAMES, words by which particular objects are indicated. Names of persons were originally usually of a single word, as in the Hebrew genealogies, Terah, Levi, Aaron. The same is true of the earlier names in Egypt, Syria, Persia, Greece, and Italy, and in the Celtic and Germanic nations. All names were originally significant. Among the Hebrews the name given a child originated in some circumstance of its birth, or expressed some religious sentiment; as Jacob, the supplanter; Samuel, God hath hearkened. Sometimes a new name was taken upon some important change in life, as Abraham for Abram. The Greeks bore a single name given the tenth day after birth by the father, and expressing generally some admirable quality; as Pherecrates, strength-bringer; Sophron, wise. The Roman names were in their origin less dignified than those of the Greeks. Some were derived from ordinary employments, as Porcius, swineherd; some from personal peculiarities, as Naso, long-nosed. Many of the Celtic and Teutonic names were derived from "God," as Gottfried, Godwin; others from spirits or elves, as Elfric, elf king.—The Jews after accumulating a considerable stock of names began to repeat them, and in the New Testament we find few new names. Among the later Greeks the eldest son generally bore the name of his paternal grandfather, and the confusion arising from the repetition of the same name was relieved by appending the father's name, either simply or turned into a patronymic, the occupation, the place of birth, or a nickname. This did not however amount to a regular system of surnames. The Romans had a very complete system of nomenclature. The commonwealth was divided into clans called *gentes*, each of which

was subdivided into families. Thus in the *gens* Cornelia were included the families of the Scipiones, Lentuli, Cethegi, Dolabellæ, Cinnæ, Sullæ, and others. Each citizen bore three names, viz.: the *prænomen*, which marked the individual; the *nomen*, which marked the gens; and the *cognomen*, which marked the family. Thus Publius Cornelius Scipio belonged to the Cornelian gens and the family of the Scipiones, while Publius was his individual, or what we now call Christian name. Sometimes a fourth name, or *agnomen*, was given, generally in honor of some military success; as Publius Cornelius Scipio Africanus, and Lælius Cornelius Scipio Asiaticus, his brother. The agnomen, being a distinction of honor, was carefully preserved by the children, and a decree of the senate granted to the elder Drusus the title Germanicus, and also to his posterity. The *prænomen*, like all given names, was commonly indicated by an initial; but the Roman initial indicated one name invariably: C. always meant Caius; M., Marcus. Cneius was indicated by Cn. There were only about 80 recognized *prænomens*. In common intercourse the *prænomen* and *cognomen* were used without the *nomen*, as C. Cæsar for C. Julius Cæsar.—The ruder populations of northern Europe continued to use a single name. There were few surnames in England before the Norman invasion, although some appear in the Saxon records. Many influences united to introduce them. Names once significant lost their meaning and were repeated in memory of those who had borne them; and as many persons bore the same name, some further distinction became necessary. As Christianity prevailed it displaced the old heathen names by names from the Bible; new names were taken in baptism, and sometimes whole companies were baptized, to save trouble, with the same name. Many surnames appear in Domesday Book, but it was not at first common to transmit the surname from father to son. In the middle of the 12th century it was thought essential that persons of rank should bear a surname. Robert of Gloucester says that in the reign of Henry I. a lady objected to marrying a natural son of that king because he had no surname, upon which the monarch gave him the surname of Fitz-Roy, *fitz* being a corruption of *filis*, son; the Russian *vitch*, as in Petrovitch, Ivanovitch, has the same value. After the reformation in England the introduction of parish registers contributed to give permanence to surnames. Yet in the beginning of the 18th century many families in Yorkshire had none, and it is said that even now few Staffordshire miners bear their fathers' names, but are known by some personal sobriquet. Sons took their fathers' names first in the modified form of patronymics; thus, Priamides, son of Priam. Heraclides meant not only a son of Hercules, but a descendant. During the middle ages the Jews formed surnames with the Hebrew *ben* or

Arabic *ibn*, meaning son, as Solomon ben Gabirol, and Abraham ibn Ezra. Among the Saxons we find in A. D. 804 Egbert Edgaring, *ing* denoting descent; and to this origin are attributed such names as Browning, Dering, Whiting. In Wales the surnominal adjunct *ap* was used in the same sense, as David ap Howell; and even in the 17th century combinations were carried up through several generations, so that a man carried his pedigree in his name, as Evan ap Griffith ap David ap Jenkin ap Hugh ap Morgan ap Owen. Sometimes, instead of any patronymic syllable, the father's name was taken in the possessive case, as Griffith William's, or as now written Williams; to which origin may be traced many names ending in *s*. The prefix *mac* was used in a similar manner by the Gaelic inhabitants of Scotland and Ireland. The Irish also used for the same purpose *oy* or *o*, signifying grandson, as O'Hara, O'Sullivan. The use of *fitz*, son, has already been mentioned; while the word "son" added to the father's name gave rise to a great number of names, as Adamson, Johnson. Subsequently convenience dropped the patronymic syllable, or prevented its repetition, and the father's name was taken without alteration as a surname. Thus many originally Christian names have become surnames. The general European system by which the son inherits the father's name still has its exceptions. The present royal family of England has never adopted an unchangeable surname. The same thing is true of many other distinguished houses, as those of Saxe, Nassau, Bourbon, and Orleans. In Spain the wife does not change her surname on marriage, and the son calls himself by the names of both parents, connecting them with the conjunction *y*, and, as Pi y Margall, or chooses either of them alone. Surnames, having been first an individual distinction, were retained by the children for the sake of retaining the honor which they marked. That which was originally a mark of rank was soon imitated and became general. The use of hereditary surnames was established in England by the middle of the 14th century, the system being consolidated by a statute of Henry V. requiring that the name and description of the party should be exactly set forth in any writ or indenture. It was formerly usual in England to obtain a special act of parliament to authorize a change of name, and subsequently to obtain a royal license; but legal authorities have decided that there is nothing in the law to prevent any one from changing his name as he may choose.—The origin and signification of surnames can be traced in very many cases, although some meanings have become obscure, being derived from words now obsolete. Many are local. To this class belong most English names beginning with the French *de*, which retain the name of the old home in Normandy; such names as Burgoyne, from Burgundy; Attemoor, from at and moor; Byfield; Underhill; Barrow, a

hill; Applegate, from *garth*, an orchard. With these should be classed names from the signs of houses, as Thomas at the Dolphin, Will at the Bull, George at the Whitehorse, &c., afterward becoming hereditary, and dropping for convenience the connecting words. Such names as Lyon, Hawke, Raven, and Heron are either local like the above, or have been taken from devices on shields. Many names originated in office or occupation. In Domesday Book occur Guilielmus Camerarius (William the Chamberlain) and Radulphus Venator (Rodolph the Hunter). The most notable name of occupation is Smith, from the Anglo-Saxon *smitan*, to smite, and originally of much wider meaning than now, including wheelwrights, carpenters, masons, and smiters in general. The "Saxon Chronicle" speaks of "mighty war smiths who overcame the Welsh." Many names of this class have the Anglo-Saxon feminine termination, as Baxter or Bagster, the feminine of baker; Webster, of Webber or weaver. It is said that the trade of weaving has been carried on by a Sussex family named Webb since the 13th or 14th century. Spencer is from *dispensator* or steward; Grosvenor from *gros veneur*, grand huntsman. The termination *ward* indicates a keeper, as Durward, doorkeeper; Hayward or Hereward, keeper of the town cattle; Woodward, forest keeper. Various personal characteristics often gave origin to names; as Paulus, little; Calvus, bald; White, Black, Brown, Gray; Read, Reed, or Reid, old spellings of red; Lightfoot; Duff, Welsh for black; Vaughan, little; Gough, red. The names of the ancient Saxon population of England were nearly all descriptive of some quality of mind or body. Thus Edward is truth-keeper; Edmund, truth-mouth; Alfred, all-peace. Some names have become great favorites, and some much used at particular periods have afterward become very unusual; as Patience, Prudence, Faithful, Thankful. There are only about 53 Christian names of men that can be used without appearance of singularity, of which 32 are taken from the Bible. The number of surnames now extant in England is about 40,000. In Scotland there are fewer in proportion to the population, certain names being remarkably frequent in particular localities, from the clansmen having taken the name of their chief.—See Salverte, *Essai historique et philosophique sur les noms* (Paris, 1824; English translation, London, 1862); Lower, "English Surnames" (London, 1842); Pott, *Die Personennamen* (Leipsic, 1853); and Ferguson, "English Surnames" (London, 1858), *Patronymica Britannica* (1860), and "The Teutonic Name System" (1864).

NAMUR. I. A province of Belgium, bounded N. by Brabant, N. E. by Liège, E. by Luxembourg, S. by France, and W. by Hainaut; area, 1,413 sq. m.; pop. in 1872, 314,718. The principal rivers are the Meuse, Sambre, and Lesse. The surface is very much diversified, and the soil is in general fertile. Iron, lead,

coal, and marble are mined. The province is divided into the arrondissements of Namur, Dinant, and Philippeville. II. A city, capital of the province, at the confluence of the Sam-



Namur.

bre and Meuse, 35 m. S. E. of Brussels; pop. in 1871, 25,600. It is the seat of a bishop, and has a cathedral, 16 other churches, a theological seminary, a royal Athenæum, an academy of design, a conservatory of music, and two museums. The cathedral, a modern structure, is ornamented in front with 20 Corinthian columns, and beside the great altar stand colossal statues of the apostles Peter and Paul. The staple manufactures are cutlery, for which Namur is famous, and leather, which gives employment to one tenth of the population. The town was taken by Louis XIV. in 1692, and by William III. of England in 1695. The emperor Joseph II. demolished its fortifications, which in 1817 were restored by the king of the Netherlands; but they were again demolished, except the citadel, in 1866.

NANA SAHIB, the title of Dhundoo Punt, a Hindoo chieftain and a leader of the sepoy mutiny in 1857, born in 1824 or 1825. He was the son of a Brahman of the Deccan, and when a little more than a year old was brought to Bithoor, where Bajee Row, the peishwa or chief of the Mahrattas, adopted him. On the death of Bajee in 1851, without heir of his body, an estate in the neighborhood which had been bestowed upon him by the British during pleasure was declared lapsed to the East India company, as they had previously refused to recognize inheritance of lands by adoption, and a pension of \$450,000 a year granted to him and his family in 1818 was also stopped. The Nana sent an agent to England

to advocate his claims, but without success, and this supposed wrong he never forgave. He lived however in great apparent friendship with the English, imitating their customs as far as he could, and was permitted to occupy the town of Bithoor, where he possessed much wealth and influence. When the sepoy mutiny broke out in 1857, he was universally trusted by the English, who applied to him for a body of soldiers to guard the treasury at Cawnpore, which he immediately granted; but no sooner had the insurrection occurred at the latter place than he put himself at the head of the rebels (June 5), and killed all the Europeans that fell into his hands, among whom were two large parties, principally of women and children, who were endeavoring to escape down the Ganges from Futtehghurh. The English at Cawnpore in the mean time defended themselves until June 27, when they surrendered on the Nana promising to send them safe to Allahabad. They were permitted to embark, but immediately afterward fired upon, many being killed and the rest brought back to land. The men were put to death at once; the women and children, after surviving nameless outrages, were massacred July 15, the day before Havelock arrived at Cawnpore, and their bodies were thrown into a well. The Nana retreated to Bithoor on the 17th, whither Havelock pursued him, driving him out of the town and dispersing his army. He soon collected another force, with which he followed Havelock into Oude, but afterward returned toward Cawnpore with the intention of attacking Gen. Neill, who was in garrison there with a small force. Reoccupying Bithoor, he threw out his left wing in the direction of Cawnpore, but it was driven back in confusion by Gen. Neill, Aug. 15; and on the next day Havelock, who had returned from Oude, defeated his whole force in a sharp engagement. Owing to the exhaustion of the victors and their want of cavalry, the Nana escaped, and, without coming directly in contact with the British, except once more at Cawnpore, where Sir Colin Campbell defeated him, Dec. 6, he continued an active and harassing warfare. On the occupation of Gwalior by the rebels in June, 1858, he was chosen peishwa of the Mahrattas, and his nephew Row Sahib was placed in command of the city. His subsequent career it is difficult to trace, for his energies were bent rather upon escaping pursuit than conducting offensive operations. Long after the other leaders had submitted or been captured, he continued, with the begum of Oude and about 10,000 rebels, to infest the northern parts of central India and the frontiers of Nepaul. There was a report that he died of fever in the latter part of 1859, but it was generally discredited; another that he crossed the Himalaya in disguise in 1860 into Thibet, and encamped near the N. base of the mountains with about 10,000 men. In November, 1874, a man was arrested in the north of India, supposed to be Nana Sahib.

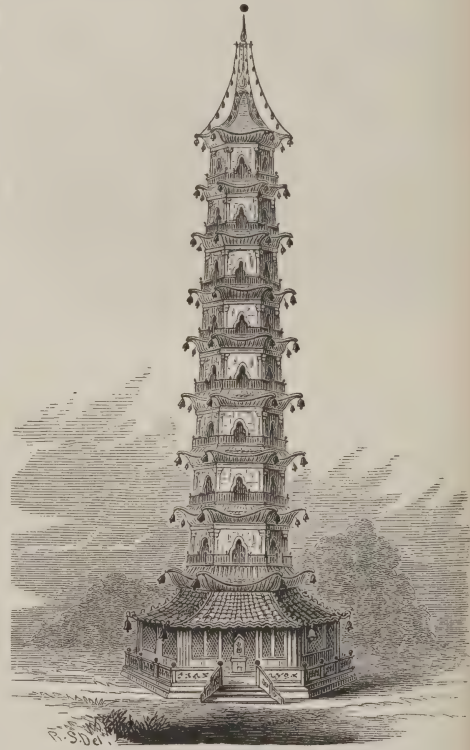
Great excitement was caused by the arrest, and he was taken to Cawnpore for identification; the result of such inquiry is not yet known (January, 1875).

NANCY, a city of France, capital of the department of Meurthe-et-Moselle on the left bank of the river Meurthe, 170 m. E. of Paris; pop. in 1872, 52,978. It stands in a beautiful and fertile plain, and consists of an old and a new town. The many fine edifices, squares, and promenades render Nancy one of the handsomest of French cities. It is the seat of a bishop, and has faculties of law, medicine, sciences and literature, a lyceum, a school of forestry, 8 Catholic churches, 6 religious communities of men and 15 of women, and a number of learned societies. The chief edifices are the cathedral, a handsome modern structure, with two towers more than 250 ft. high; the church of St. Epvre, which contains several fine paintings, and a fresco attributed to Leonardo da Vinci; the church of the Cordeliers, in which is the mausoleum of the dukes of Lorraine; an ancient Gothic castle, which was nearly destroyed by fire on the withdrawal of the German troops in July, 1871; the museum, with pictures by Isabey, a native of Nancy, and other works of art; and hospitals. Hosiery, muslin, cotton yarn, woollen cloth, calico, lace, &c., are manufactured. There are three fairs yearly, one of which lasts 20 days.—Nancy was the capital of the duchy of Lorraine from the 13th century till its absorption by France; and under its walls Charles the Bold, duke of Burgundy, was defeated and slain, Jan. 5, 1477, by René II., duke of Lorraine.

NANDOU. See OSTRICH.

◆**NANKING**, or Nankin (*i. e.*, the “southern capital,” in distinction from Peking, the “northern capital”), called also KIANGNING-FU, a city of China, the chief town of the province of Kiangsu, and the residence of the governor general of the three provinces of Kiangsu, Nganhwui, and Kiangsi, about 3 m. S. of the Yangtse-kiang river, about 200 m. from its mouth, 560 m. S. by E. of Peking, and on the grand canal connecting Canton and Peking, in lat. 32° 2' N., lon. 118° 49' E.; pop. estimated before the Taiping rebellion at 400,000 or more, but now probably much less. The river opposite the city is 1½ m. broad and 25 fathoms deep, with a rocky bottom, and a current of from 3 to 5 m. an hour. The region about the city is very marshy, and the excessive moisture makes it unhealthy for Europeans and natives of other provinces. The remains of ancient walls have been traced for a circuit of about 35 m. The modern walls are about 40 ft. high and 18 m. in circumference, and enclose a space of which not more than one eighth is occupied by the town. On the W. side they are strengthened by a deep ditch from the river. The great extent of the walls makes them difficult to defend, and the city is overlooked by the hills on the east. The eastern part of the city is irregular and thinly inhabit-

ed, but in other parts the houses are so closely packed that one looking from a high building over the tent-like roofs of the temples can scarcely trace the streets. The Mantchoo and Chinese parts are separated by a cross wall. The principal streets are of moderate width, and were formerly lined with handsome shops. Most of the buildings of former note have been destroyed. There is a curious square tower 50 ft. high, on the top of which is a finely sculptured figure of a turtle, carved from a single block of marble. Not far from the walls is an ancient cemetery, which travellers have called the tombs of the kings, approached



Porcelain Tower (destroyed by the Taipings).

by an avenue of colossal figures. At some distance from these statues are rude colossi of horses, elephants, and other animals, without regular arrangement, and perhaps removed from their original places. The celebrated porcelain tower was destroyed by the rebels. It was built in 1413-'32, and was of an octagonal form, 260 ft. high, in nine stories, each adorned with a cornice and gallery, and covered with a roof of green tiles, with a bell suspended at each corner, which sounded when moved by the wind. On the top was a pinnacle in the shape of a pineapple, surmounted by a gilded ball. A spiral staircase led to the summit.—Before the accession of the Mongol dynasty the court sometimes resided at Nanking. The first

two emperors of the Ming dynasty also resided in it. It was taken by the Mantchoos in 1645, and continued to be a very important city, famous for various manufactures, especially for the cloth called from it nankeen. It was invested by Sir H. Pottinger Aug. 14, 1842, and the treaty with England was signed there Aug. 26. It was taken March 19, 1853, by the Taiping rebels, who tried to establish there the ancient "heavenly empire." They held it for 11 years. During this occupation a collision with the British ships under Lord Elgin led to a bombardment of the city, which ruined the Chinese batteries. On July 19, 1864, it was taken by the imperialists, who sprung a mine of 68,000 lbs. of gunpowder under the wall, and entered through the breach. They found the rebel emperor dead by suicide, with most of his higher officials. More than £2,000,000 of treasure was found concealed in the palace. Since the imperialist occupation there has been some attempt to restore the former manufactures, but with little success. The governor general has established a manufactory of shot and shell. The business part of the city is being gradually restored. There is little or no foreign trade; and though the city is a free port, few foreigners reside there.

NANSEMOND, a S. E. county of Virginia, bordering on North Carolina and the Dismal Swamp, and drained by branches of the Nansemond river; area, 444 sq. m.; pop. in 1870, 11,576, of whom 5,517 were colored. It has a level surface and sandy soil. Lumber, tar, and turpentine are exported in considerable quantities. The Seaboard and Roanoke, and the Atlantic, Mississippi, and Ohio railroads pass through it. The chief productions in 1870 were 5,405 bushels of wheat, 228,057 of Indian corn, 22,466 of oats, 22,169 of Irish and 57,594 of sweet potatoes. There were 1,017 horses, 1,392 milch cows, 2,192 other cattle, 1,381 sheep, and 11,044 swine. Capital, Suffolk.

NANTASKET, a narrow peninsula about 5 m. long, extending into Massachusetts bay, in Plymouth co., Mass., about 22 m. from Boston by railroad and 9 m. by water. It is a favorite summer resort on account of its facilities for sea bathing. This peninsula comprises the town of Hull, which was settled about 1625; pop. in 1870, 261. (See COHASSET.)

NANTERRE, a town of France, in the department of the Seine, at the foot of Mont Valé-

rien, 6 m. W. N. W. of Paris; pop. about 4,000. It is celebrated as the birthplace of St. Genevieve, and also for its pastry. It is a place of great antiquity, and the Gauls here celebrated druidical rites. It was formerly fortified, but the ramparts have been converted into promenades. Clotaire II., son of Chilperic, was baptized here in 591. In the 14th and 15th centuries it endured many vicissitudes.

NANTES (anc. *Condivicnum*), a city of France, capital of the department of Loire-Inférieure, on the right bank of the Loire, at its junction with the Erdre, 210 m. W. S. W. of Paris; pop. in 1872, 118,517. The old town W. of the Erdre was walled until the end of the 17th century. In the new quarter the houses are handsomely built of white stone, although the streets are narrow. There are however some fine boulevards, and the quays extending for nearly 2 m. along the Loire and Erdre formerly composed a famous promenade, lined with



Nantes Castle and Cathedral.

trees, which have been sacrificed to the railway. The cathedral of St. Pierre, built in the 15th century, is unsightly externally, the towers scarcely rising above the roof, but has a finely sculptured triple portal, and contains the mausoleum of the last duke of Brittany and his duchess. The castle is an irregular Gothic pile flanked with round towers. Its chapel was used as a powder magazine, and was blown up in 1800, destroying much of the building. In this castle Henry IV. signed the edict of Nantes, April 13, 1598, which secured liberty of religion to the French Protestants, until its revocation by Louis XIV., Oct. 22, 1685. In 1654 it was the prison of the cardinal de Retz. Most of the kings of France from Charles VIII. have resided in it at some time. The museum contains more than 1,000 paintings and 300 sculptures. The building docks are of great extent, and one fourth of the trading vessels of France are built at Nantes. The most im-

portant industry is sugar refining, and there are considerable cotton and woollen manufactories. The town communicates by canal with Brest. It has a large foreign and internal trade, and much wheat and flour is exported to England.—Nantes was the stronghold of the ancient Nannetes. In the middle ages it was the capital of the duchy of Brittany. It was three times taken by the Normans and nearly ruined. During the English wars in France it fell repeatedly into the hands of the opposite parties. During the revolution, it was unsuccessfully besieged by the Vendean army in 1793, and subsequently was the scene of the *noyades* and "republican marriages." (See CARRIER.)

NANTEUIL, Célestin, a French artist, born in Rome in 1813, died in Paris in 1873. He studied under Langlois and Ingres, and exhibited his first work, a "Holy Family," in 1833, followed by "A Beggar" (1834), and "Christ Healing the Sick" (1837). But he was mainly employed as a lithographer, and in the course of about 30 years executed more than 2,000 vignettes for literary and musical publications. Among his more recent paintings are "The Temptation" (1851), "The Vine" (1853), "Souvenirs of the Past" and "The Kiss of Judas" (1858), the latter after Van Dyck, of which he also produced an admirable engraving.

NANTUCKET, a town and county of Massachusetts, coextensive with each other, comprising the island of Nantucket, the islets of Tuckernuck and Muskeget, and the Gravelly and Swyle islands adjacent to it on the west; aggregate area, 48 sq. m.; pop. in 1775, 4,500; in 1840, 9,012; in 1860, 6,094; in 1870, 4,123. Nantucket island is situated in the Atlantic ocean, 18 m. S. of Cape Cod, 85 m. S. E. of Boston, and is separated from Martha's Vineyard on the west by a channel 8 m. wide. It is of an irregular triangular form, about 16 m. long from E. to W., and for the most part from 3 to 4 m. wide, with an area of about 45 sq. m. It has a level surface in the south, and is slightly hilly in the north. The soil is light, and with the exception of some low pines the island is treeless. There are several ponds containing fine fish. Farming and fishing are the chief occupations of the people, the surrounding waters abounding in fish of various kinds. The climate is mild in winter and cool in summer, and the island is becoming a favorite summer resort. It constitutes a customs district, but has little commerce. There is a lighthouse on Sankaty head (lat. 41° 17' N., lon. 69° 57' 35" W.), near the S. E. extremity of the island; another, known as Nantucket light, on Sandy or Great point (lat. 41° 23' 22", lon. 70° 2' 25"), at the N. E. extremity; and several W. of the entrance to Nantucket harbor. Wrecks are not infrequent. Nantucket shoals, about 50 m. long and 45 m. wide, are S. E. of the island, and are dangerous to navigation. There are two post villages, Nantucket on the N. side of the island, and Siasconset on the S. E. Nantucket har-

bor is deep and secure, though the entrance is obstructed by a bar with only 7½ ft. of water at low tide. Steamers run daily to Wood's Hole on Cape Cod, connecting with railroad for Boston. The town contains a national bank, with a capital of \$200,000; a savings bank; five public halls, including the town hall; several public schools; a semi-weekly and a weekly newspaper; and nine churches, viz.: Baptist (2), Congregational, Episcopal, Friends' (2), Methodist, Roman Catholic, and Unitarian. The Coffin school is an incorporated endowed institution, including a grammar and a high school department. The Athenæum has a library of 4,000 volumes, and there is a circulating library.—Nantucket was first settled in 1659 by Thomas Macy, who emigrated from Salisbury, Mass. It was then partially wooded with oaks and other deciduous trees and conifers; but the destruction of the trees ultimately made the island almost a desert. It was included in the grant to the Plymouth company in 1620, in 1664 annexed to New York, and in 1693 ceded to Massachusetts. The town was incorporated as Sherburne in 1673, and in 1795 the name was changed to Nantucket. When it was first settled there were about 1,500 Indians on the island. They decreased to 358 in 1763, in which year a pestilence carried off 222 of them. The last one of full blood died in 1821, and the last half-breed in 1854. Nantucket has been chiefly noted as a seat of the whale fishery, having been at one time the chief whaling port in the world. The fishery from the shore commenced about 1670, and was continued till 1760. The first sperm whale was captured in 1712, and immediately after small vessels were fitted out for short cruises. The size of the vessels and the length of the cruises were gradually increased, until in 1775 150 vessels were engaged in the business, extending their voyages as far as Davis strait and the coast of Brazil. The war of the revolution destroyed this business, but after its close it was revived. The first ship was despatched to the Pacific in 1791. The town increased in size and prosperity till 1846, when it was visited by a severe conflagration, destroying property to the value of nearly \$1,000,000. After this the whale fishery and with it the prosperity of the town rapidly declined. The fishery began to revive before the breaking out of the civil war, but afterward became extinct. (See WHALE FISHERY.)

NAPA, a N. W. county of California, drained by Napa and Las Putas rivers; area, 828 sq. m.; pop. in 1870, 7,163, of whom 263 were Chinese. The surface is diversified, but generally fertile and well adapted for cultivation. The Coast range of mountains extends along the S. W. border, and Mount St. Helena, at the head of the Napa valley, attains an elevation of 3,700 ft. It contains numerous medicinal springs, constantly increasing deposits of sulphur, two lakes yielding large quantities of borax, geysers or hot springs about 60 m. N.

of Napa City, and quicksilver. The Napa branch of the California Pacific railroad traverses it. The chief productions in 1870 were 264,240 bushels of wheat, 34,890 of barley, 20,789 lbs. of wool, 56,860 of butter, 46,745 gallons of wine, and 4,555 tons of hay. There were 1,755 horses, 1,128 milch cows, 2,703 other cattle, 6,006 sheep, and 6,243 swine. Capital, Napa City.

NAPHTALI, the sixth son of Jacob, the second child borne to him by Bilhah, the handmaid of Rachel. In the census before Sinai the tribe of Naphtali numbered 53,400 fighting men, and at the entrance into Canaan 45,400, occupying a middle position among the tribes. It received as its allotment a part of upper Galilee, extending from Lake Gennesaret to the sources of the Jordan. The only famous hero of the tribe was Barak. It is distinguished in the song of Deborah for the alacrity with which it obeyed the call to arms against the oppressors of the Hebrews. The principal town in its territory was Kadesh, the city of refuge.

NAPHTHA, a term originally applied to a variety of pungent, volatile, inflammable liquids, chiefly belonging to the class of ethers; it was then extended to oils of natural origin, rock oil, petroleum, &c. Subsequently the light oil of coal tar, owing to its resemblance to mineral oil, was termed naphtha; more recently it has been again extended so as to include most of the inflammable liquids produced by the dry distillation of organic substances. In the United States it is applied to a series of hydrocarbons obtained from petroleum, and having specific gravities ranging from 0.625 (rhigolene) to 0.742, and boiling points varying with the densities from 65° to 300° F. The following are some of the naphthas known in commerce: 1, boghead naphtha, obtained by distilling the Torbane hill mineral or boghead coal at as low a temperature as possible; 2, bone naphtha, Dippel's animal oil; 3, coal naphtha, obtained by the distillation of coal tar, and often confounded with benzole; 4, mineral naphtha, from petroleum. According to S. Dana Hayes, the petroleum naphthas have distinguishing characteristics by which they are easily recognized, and which place them in a class by themselves; and aside from their odors, densities, boiling points, volatilities, and solvent powers, a noticeable peculiarity is the absence of oily bodies; they do not leave any permanent stain on common writing paper, as do all the heavier oils obtained from petroleum. The commercial products are:

	Specific gravity.	Beaumé scale.	Boiling point.
C. Naphtha.....	0.706	70	150° F.
B. Naphtha.....	0.724	67	220° "
A. Naphtha.....	0.742	65	300° "

5. Wood naphtha, pyroligneous ether, pyroxylic spirit, or methylic alcohol, is a colorless, mobile, indifferent, inflammable liquid, which

burns with a faintly illuminating, bluish flame; it is miscible in all proportions with water, alcohol, ether, and ethereal oils; specific gravity 0.796, boiling point 149° F. When pure it has been prescribed in medicine for diseases of the lungs, and owing to its cheapness it is often substituted for alcohol, and sometimes used to adulterate brandy.—As commonly described, naphtha is a very inflammable colorless liquid, of bituminous odor, tasteless, soluble in all proportions in absolute alcohol and in ether, insoluble in water, of specific gravity 0.700 to 0.847. It dissolves the fixed and essential oils in all proportions, and is hence advantageously used for removing grease from fabrics, and for the extraction of oils from seeds. It also dissolves sulphur, phosphorus, iodine, gum lac and copal, camphor, caoutchouc, the resins, &c.; a quality that adapts it for the preparation of varnishes, and for other similar uses in the arts. In its preparation from artificial coal oils it is found that those which produce paraffine yield in general naphtha, while the product of those which contain naphthaline is rather limited to the hydrocarbons of the benzole series. It is manufactured into gas, is used to increase the illuminating power of coal gas in the place of benzole, and is sold for combustion in gas stoves and in lamps. There is probably no chemical product which has occasioned the loss of so many lives and the destruction of so much property as naphtha. Since its cheap manufacture as an incidental product in the distillation of petroleum, it has been thrown upon the market in enormous quantities, and owing to its cheapness has been mixed with petroleum or sold under a great variety of names for heating and illuminating purposes; and from its highly explosive and inflammable nature, it has proved little better in the hands of ignorant people than so much gunpowder. Its sale is now everywhere prohibited except for legitimate purposes.

NAPHTHALINE ($C_{10}H_8$), a hydrocarbon obtained from the distillation of numerous organic bodies, such as coal, wood, resin, oils, and animal substances; also by conducting the vapor of acetic acid, alcohol, ether, volatile oils, and camphor through red-hot tubes. It has been prepared by the passage through hot tubes of ethylene, marsh gas, and other hydrocarbons, as well as of a mixture of benzole and ethylene, sulphuretted hydrogen and disulphide of carbon, hydrogen, and the vapors of chloride of carbon. In general we can say that naphthaline is the product of the decomposition of organic matter at a red heat, just as the oxidation of the same bodies yields oxalic acid. Warren and Storer found naphthaline as a native product in the petroleum of Burmah. It was first noticed by Garden in 1820, was observed about the same time by Reichenbach, and fully analyzed and its true chemical composition determined by Faraday. The most laborious researches upon it were made by Laurent, who was engaged for 20 years in the

study of the substitution products of this interesting body.—The raw material usually employed in the preparation of naphthaline is coal tar, and the method recommended by Vohl is as follows: The dead oil is run into vats, and left in a cool place for six to eight days, when crystals of naphthaline are formed. The liquid portion is then drawn off, the crystalline mass stirred up to a pap by a pestle, the adhering oil removed in a centrifugal machine, and the mass finally placed under a hydraulic press. The press cake is then transferred to an iron vessel provided with a steam coil and a stirrer, so arranged that it can be operated when the vessel is closed. The fused mass is then well mixed with a few per cent. of caustic soda, the lye run off, and the operation repeated three times, and finally washed with hot water until no further reaction can be perceived. In this manner all of the carbofic acid, creosote, resinous matter, and other impurities are removed. The still fluid naphthaline is then intimately mixed with a few per cent. of sulphuric acid of 45° B., the acid let off, washed out with water, and the contents of the vessel agitated with strong caustic soda and left for two or three hours to subside, at a temperature of 100° C. The naphthaline thus treated is further purified by distillation over a free fire from cast-iron stills capable of holding a ton. At first naphthaline mixed with water passes over, but at 210° C. pure naphthaline distils, and so rapidly that 100 lbs. can be obtained in 20 minutes. The naphthaline vapors are condensed in water at 80° C. in closed vessels placed in water baths, also kept at 80°. The pure naphthaline obtained in this way is run into conical glass, metal, or moistened wooden moulds, from the sides of which it separates by contraction on cooling, and is introduced into commerce in sticks like brimstone. Naphthaline, when pure, has the form of brilliant white, scaly, rhombic plates of peculiar odor, having a specific gravity of 1.151, according to Vohl; a melting point, according to Kopp, of 79.2° C.; and a boiling point of 216.4° to 216.8° C. It is in small quantities volatile at lower temperatures, and goes over copiously with steam. It possesses at first a weak, subsequently a burning taste; is insoluble in cold, very slightly in hot water; easily soluble in warm alcohol, ether, benzole, turpentine, volatile and fatty oils, and in acetic and oxalic acids. According to Vohl, the fused naphthaline absorbs air in the same manner as molten silver, which is richer in oxygen than the atmosphere, and gives it up again on cooling. Naphthaline dissolves indigo, phosphorus, sulphur, succinic, benzoic, and oxalic acids, chloride of mercury, and the sulphides of arsenic, tin, and antimony, which on cooling usually separate in a crystalline condition. Caustic potash and dilute sulphuric acid do not act on naphthaline, but chlorine, bromine, nitric acid, and concentrated sulphuric acid readily attack it. It crackles in

the hand like sulphur, and becomes negatively electric when rubbed with silk. It is destructive to moths, and is used as a substitute for camphor in the protection of woollens, plants, and objects of natural history. When burned in its pure state it gives rise to copious clouds of fine lampblack.—The researches of Laurent have shown the existence of a numerous series of substitution compounds, in which chlorine and bromine take the place of the hydrogen element, and sometimes replace each other. The bodies so formed are not of much practical importance, but their investigation has had a remarkable influence upon the recent progress of organic chemistry. A table of a few of these compounds will serve to illustrate the manner of substitution:

Naphthaline.....	C ₁₀ H ₈
Chlonaphthase.....	C ₁₀ H ₇ Cl
Bronaphthase.....	C ₁₀ H ₇ Br
Chloraphthase.....	C ₁₀ H ₆ Cl ₂
Bronaphthase.....	C ₁₀ H ₆ Br ₂
Chlonaphthase.....	C ₁₀ H ₅ Cl ₃
Bronaphthase.....	C ₁₀ H ₅ Br ₃
Chlorobronaphthase.....	C ₁₀ H ₄ Cl ₂ Br
Chlonaphthase.....	C ₁₀ H ₄ Cl ₄
Chlorobronaphthase.....	C ₁₀ H ₄ Cl ₃ Br ₂
Chloribronaphthase.....	C ₁₀ H ₄ Cl ₃ Br
Bronaphthase.....	C ₁₀ H ₄ Br ₄
Bromechlonaphthase.....	C ₁₀ H ₃ Br ₂ Cl ₃
Chlonaphthase.....	C ₁₀ H ₃ Cl ₆
Chlonaphthase.....	C ₁₀ Cl ₈

—Naphthalic or phthalic acid, made by the oxidation of naphthaline by sulphuric acid and black oxide of manganese, can be converted into benzoic acid, benzole, nitro-benzole, and finally into aniline; and in this way naphthaline is one of the sources of aniline colors. Magdala red is a dye prepared by the action of nitrous acid on naphthylamine, which in turn is derived from naphthaline. Naphthaline yellow is made by digesting 100 parts of naphthaline for a few hours in a mixture of 200 parts of water and 20 parts of nitric acid, and dissolving the resulting crystals in ammoniacal water. Kopp's brown is produced by boiling nitro-naphthaline with sulphuric acid. Other compounds are naphthazarine, similar to alizarine, called also dianthine; naphthylamine, one of the most interesting; Perkins's violet; naphthaline alcohol, or naphthole; Hoffmann's naphthaline red; naphthyl-rosaniline; and numerous others.

NAPIER, Sir Charles, a British admiral, born at Merchiston hall, Stirlingshire, March 6, 1786, died Nov. 6, 1860. He was a grandson of the fifth Lord Napier and a descendant of the inventor of logarithms. He entered the navy in 1799; in 1805 was appointed lieutenant; in 1808 commanded the brig Recruit of 18 guns; and in April, 1809, for gallant service against the French, was made a post captain. He subsequently served with the army in Portugal; and between November, 1811, and June, 1815, he participated in numerous exploits on the coast of southern Italy and the North American station. After a long period of inactivity he was in 1829 employed in special service on the coast of Portugal, and in 1838

was appointed by Dom Pedro to command the Portuguese fleet destined to operate against Dom Miguel. On July 5, 1833, he gained a signal victory off Cape St. Vincent, and was created Viscount Cape St. Vincent, grand cross of the tower and sword, and a grandee of the first class in Portugal. In 1839 he re-entered the English navy, and in 1840 became commodore under Admiral Stopford of the fleet employed on the coast of Syria, where he participated in the storming of Sidon and the capture of Beyrout and Acre. In the same year he was created a K. C. B., besides receiving several continental decorations; and in 1846 he was appointed rear admiral of the blue, and given command of the channel fleet. In 1849 he was superseded, but upon the breaking out of war with Russia he was put in command of the fleet destined to act against Cronstadt and other Russian ports in the Baltic, with the rank of vice admiral of the blue. He sailed from Spithead, March 11, 1854, with the most magnificent fleet ever equipped by Great Britain, promising to take Cronstadt in a month. His return to England in December, without having accomplished anything of importance beyond the capture of Bomarsund, subjected him to considerable ridicule, and led to recriminations between himself and the ministry. In 1858 he was made admiral of the blue. He was member of parliament for Marylebone from 1841 to 1847, and after 1855 for Southwark. He published a series of letters on naval reform, and in 1851 "The Navy, its Past and Present State." He also wrote "Account of the War in Portugal" (2 vols., 1836), and "The War in Syria" (2 vols., 1842). A "History of the Baltic Campaign of 1854" was prepared from materials furnished by him (1857). His "Life and Correspondence" was published by Maj. Gen. E. Napier (2 vols., 1862).

NAPIER, Sir Charles James, a British soldier, cousin of the preceding, born in Whitehall, London, Aug. 10, 1782, died at Oaklands, near Portsmouth, Aug. 29, 1853. At an early age he received an ensign's commission in the 4th regiment of foot, with which he served during the Irish rebellion of 1798, and again in 1803. He commanded the 50th regiment of foot in the retreat of Sir John Moore, and in the battle of Corunna (Jan. 16, 1809) received five severe wounds, and was left for dead in the hands of the enemy. He returned to England on parole some months later, to the astonishment of his friends, who had already administered upon his estate. Before procuring employment he occupied his leisure by writing pamphlets on a variety of subjects. He finally went to the Peninsula as a volunteer, had two horses shot under him at Coa, and was severely wounded at Busaco. In 1811 he procured a regular command, and served until the close of the war. Immediately afterward he was sent to Bermuda as lieutenant colonel of the 102d regiment, and for some months participated in expeditions which harassed the

coast of the United States. The return of Napoleon to France recalled him to Europe, but he arrived too late to participate in the battle of Waterloo. In 1824 he was appointed governor of Cephalonia, where he remained five years, and was active in promoting the cause of Greek independence. After a long period of inactivity, he was appointed commander of the forces in the northern district of England, whence in 1841 he was transferred to the command of the army in Bombay. He commenced his Indian career by a number of sweeping reforms in the service, which gained him the dislike of his officers. Upon the arrival of Lord Ellenborough in India in February, 1842, as governor general, Napier sketched out for him the plan of a second Afghan campaign; and in the early part of the succeeding year he took the field against the ameers of Sind. He made a rapid march across a desert to the fortress of Emaun Ghur, one of the chief strongholds and magazines of the ameers, which he blew up. On Feb. 17, 1843, with a force of less than 2,000 men, he overcame an army of 35,000 Belooches at Meeanee, compelling the surrender of the important fortress of Hyderabad. On March 24 he defeated Shere Mohammed, who had collected an army of about 25,000 men at Dubba, near Hyderabad. The war being ended, Napier set to work to improve the condition of the conquered province, of which he had been appointed governor. He protected the Hindoo and Sindian population, who had long been subjected to the military despotism of the Belooches, encouraged native industry, and abolished slavery and the slave trade, sutteeism, infanticide, the military tenure of lands, and other barbarous customs. At the breaking out of the first Sikh war in 1845 he organized a force of 15,000 men to operate against the enemy, but was ordered elsewhere before the commencement of the campaign. In 1847 he returned to England. In March, 1849, he was again sent to India, as commander-in-chief of the British forces in the second Sikh war, superseding Lord Gough. He found the war virtually ended before his arrival, and coming into collision with the governor general, Lord Dalhousie, on some points of prerogative, he returned to England in 1850. His health rapidly failed after this, his last public appearance being at the funeral of the duke of Wellington in November, 1852. Among his numerous publications those of most permanent importance are: "Lights and Shadows of Military Life" (1840), a free imitation of Alfred de Vigny's *Grandeur et servitude militaire*; "History of the Colonies: Ionian Islands" (1853); and "Indian Misgovernment and Lord Dalhousie" (1853). His career in India has been described by his brother Sir William F. P. Napier, who also published his "Life and Opinions" (4 vols., London, 1857). Monuments to him have been placed in Trafalgar square and St. Paul's church, London.

NAPIER, Henry Edward, an English author, born March 5, 1789, died Oct. 13, 1853. He was the youngest brother of Sir Charles James Napier, and was a captain in the navy. He is the author of "Florentine History from the earliest Authentic Records to the Accession of Ferdinand III., Grand Duke of Tuscany" (6 vols. 12mo, London, 1846-'7).

NAPIER, John, laird of Merchiston, the inventor of logarithms, born at Merchiston castle, near Edinburgh, in 1550, died there, April 4, 1617. In 1562 he entered St. Salvator's college in the university of St. Andrews, and subsequently passed several years in travelling in France, Italy, and Spain. On his return to his native country he did not mingle in active life, and but little is known of him until he had arrived at the age of 40. In 1593 he published "A Plain Discovery of the Revelation of St. John" (4to, Edinburgh), and in the dedication gave King James some advice in regard to religious matters, and the propriety of reformation in his own "house, family, and court." A letter of his to Anthony Bacon, concerning secret inventions for national defence, written in 1596, still exists in the archbishop's library, Lambeth. One of these was for a burning mirror to set fire to ships by reflecting the rays of the sun; another was a device to accomplish the same purpose by reflecting "the beams of any material fire or flame;" another an instrument which should scatter such an amount of shot in all quarters as to destroy everything near it. Nothing is heard of him after this until in 1614 he brought out his system of logarithms, entitled *Mirifici Logarithmorum Canonis Descriptio* (4to, Edinburgh). Although published then, it is evident that Napier had begun the investigation of this subject before 1594, from a letter written by Kepler to Crugerus in 1624, in which he says: *Nihil autem Nepierianam rationem esse puto; etsi Scotus quidem literis ad Tychonem, anno 1594, scriptis jam spem fecit canonis illius mirifici*. No sooner was the work published than Henry Briggs, then professor of mathematics in Gresham college, London, began the application of the rules in his *Imitatio Nepiereæ*, and the system proposed by him is now commonly used. Napier's last work was his *Rabdologia seu Numerationis per Virgulas Libri duo* (12mo, Edinburgh, 1617), in which he explained a contrivance to facilitate multiplication and division by means of small rods, which invention goes under the name of Napier's bones. After his death was published his *Mirifici Logarithmorum Canonis Constructio* (12mo, 1619), in which he explained the principle of the construction of logarithms. Napier also enriched the science of trigonometry by the general theorem for the resolution of all the cases of right-angled spherical triangles. There are two lives of Napier: one by the earl of Buchan, with an analysis of his works by Dr. Walter Minto (1787), and another by Mark Napier (1834).

NAPIER, Macvey, a Scottish writer, born in 1776, died in Edinburgh, Feb. 11, 1847. He studied law, was chosen librarian of the society of writers for the signet, and in 1825 was selected for a lectureship on conveyancing, which was soon afterward made a professorship in the university of Edinburgh, a post which he occupied till his death. In 1817 he published an essay on the writings of Lord Bacon, which was subsequently incorporated with a work entitled "Lord Bacon and Sir Walter Raleigh" (8vo, Cambridge, 1853). He edited the "Supplement to the Encyclopædia Britannica" (6 vols. 4to, Edinburgh, 1815-'24), and afterward superintended the seventh edition of the entire work (1830-'42), to which he contributed many important articles. He succeeded Mr. Jeffrey as editor of the "Edinburgh Review" in 1829, and conducted it for 17 years. In 1837 he resigned his office of librarian, being made one of the principal clerks of the court of session.

NAPIER, Robert, a Scottish engineer, born in Dumbarton, June 18, 1791. The son of a blacksmith, he preferred serving an apprenticeship to that trade to going to college. In 1811 he went to Edinburgh, but had little success, and afterward to Glasgow, where he was employed a short time with Mr. W. Lang, who manufactured jacks and machinery for calendar works. In 1815 he purchased with the help of his father a blacksmith's establishment at the Gallowgate of Glasgow, and set up business for himself. In 1823 he constructed his first marine engine, the forerunner of a large number of works of a similar character. In 1830, in conjunction with the city of Glasgow steam packet company, he established a line of vessels which remained unsurpassed till superseded by railways. In 1834 he furnished the Dundee and London shipping company with the Dundee and Perth steamships; in 1836 the East India company with the *Berenice*; and, in addition to several other works, in 1840 supplied Samuel Cunard with his first four steamers. He built in 1856 the iron steamship *Persia*, of 3,600 tons. In 1859 the firm of Robert Napier and son undertook the construction for the British navy of the *Black Prince*, of 6,100 tons, in 1860 of the *Hector*, of 4,060 tons; and they have constructed steam rams and iron-clad ships of war for foreign governments. Mr. Napier received the great gold medal of honor at the Paris exposition of 1855, and the decoration of the legion of honor.

NAPIER, Sir William Francis Patrick, a British author, brother of Sir Charles James Napier, born in Castletown, county Kildare, Ireland, in 1785, died at Clapham Park, near London, Feb. 12, 1860. He entered the army at 15 years of age, and became a captain in 1804. After serving in the expedition to Copenhagen in 1807, he accompanied Sir John Moore to Portugal in 1808, and during the next six years was an active participant in the peninsular

war. In 1811 he became major and in 1813 lieutenant colonel. He was repeatedly wounded during the war, particularly at Almeida, and in following the retreat of Masséna from Portugal in 1811. He became major general in 1841. Between 1842 and 1848 he was lieutenant governor of Guernsey, and in 1848 he was created knight commander of the bath. In 1851 he became lieutenant general, and in 1859 general. He is best known as a writer of military history. His principal work is "The History of the War in the Peninsula and in the South of France from 1807 to 1814" (6 vols., London, 1828-'40). In the preparation of this eminent work he was supplied with materials and documents by the duke of Wellington, Marshal Soult, and other officers, English and French. His wife, a niece of Charles James Fox, deciphered for him the secret correspondence of Joseph Bonaparte. The critical and positive character of this work subjected it to much animadversion, calling out several replies from the author, which were appended to the later editions under the title of "Justificative Pieces." In 1855 he published a volume entitled "English Battles and Sieges in the Peninsula," consisting principally of extracts from his large work, with portions rewritten. He also published "The Conquest of Scinde" (1845), and "The Life and Opinions of the late Sir Charles Napier" (1857).

NAPIER OF MAGDALA, Robert Cornelis Napier, baron, a British general, born in Ceylon, Dec. 6, 1810. His father was a major in the royal artillery, and he was educated in the royal military academy at Addiscombe, and in 1826 entered the Bengal engineers. In the Sutlej campaign of 1845-'6, during which he held the rank of brigade major, he served with distinction, and was severely wounded. He was wounded a second time at the siege of Mooltan, where for some time he acted as chief engineer officer. In 1849 he was made a lieutenant colonel for meritorious conduct at Guzerat. He was engaged in active service throughout the sepoy mutiny, distinguishing himself by the engineering operations which he conducted against Lucknow, and subsequently as a brigade commander, particularly at the siege of Gwalior and the battle of Powree. In 1858 he was made a knight commander of the bath. Two years later he took part in the Anglo-French expedition against China, with the local rank of major general, and achieved special distinction in the operations preceding the capture of Peking. He became a colonel of the royal engineers in 1862; and from 1861 until his appointment to the command of the Bombay army with the local rank of general in 1865, he was a member of the council of the governor general of India. In October, 1867, having been promoted to the full rank of lieutenant general, he was selected by the home government to command the expedition to Abyssinia for the release of the British prisoners held by King Theodore at

Magdala. He landed at Annesley bay on Jan. 7, 1868, and in a brief and brilliant campaign defeated the Abyssinian army, and on April 13 assaulted and captured Magdala, the British prisoners having previously been released. (See **ABYSSINIA**.) For this achievement Sir Robert Napier received the grand cross of the bath, and was raised to the peerage July 17, 1868. In 1870 he was appointed commander-in-chief of the forces in India, with local rank as general, and in this capacity he is a member of the viceroy's council. He has a parliamentary annuity of £2,000 voted in 1868, and has thrice received the thanks of parliament: in 1859, for his services during the Indian mutiny; in 1861, for his skill and intrepidity at Peking; and in 1868, for his conduct of the Abyssinian expedition.

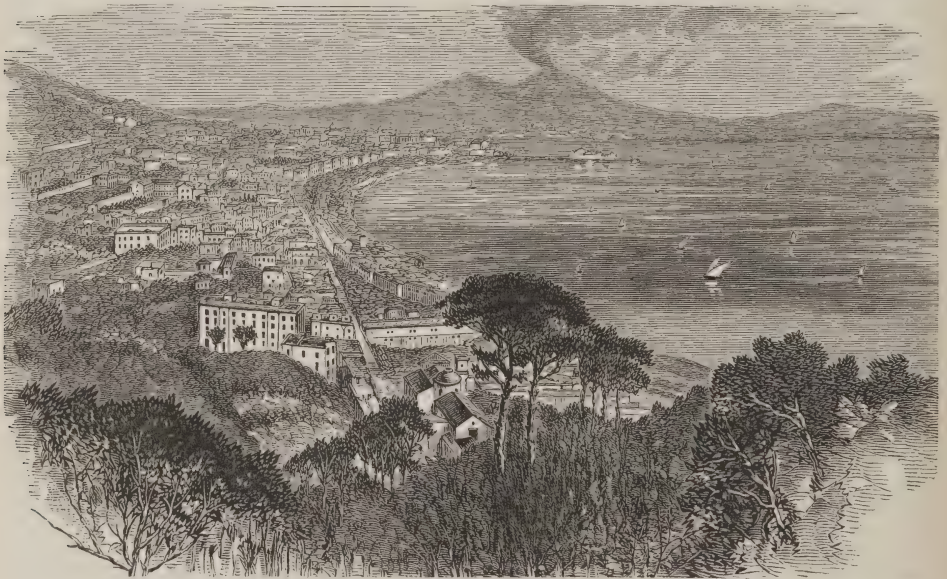
NAPIERVILLE, a S. W. county of Quebec, Canada; area, 152 sq. m.; pop. in 1871, 11,688, of whom 10,815 were of French origin. It is traversed by a division of the Grand Trunk railway. Capital, Napierville.

NAPLES. I. Kingdom of. See **SICILIES**, THE Two. **II.** A province of the kingdom of Italy, bordering on Caserta, Salerno, and the Tyrrhenian sea; area, 412 sq. m.; pop. in 1872, 907,752. It is the most beautiful and most fertile of all the Italian provinces, producing olives and wines of the best quality. The eastern part is mountainous, being traversed by ramifications of the Apennines. The principal rivers are the Sarno and Sebeto. There are many lakes, none of them large; the most important are Lakes Fusaro, Averno, and Lucrino (the Acherusia, Avernus, and Lucrinus of ancient Campania). It is divided into the districts of Casoria, Castellamare di Stabia, Naples, and Pozzuoli.

NAPLES (Ital. *Napoli*; anc. *Neapolis*), the largest city of Italy, in the province of the same name, on the N. coast of the bay of Naples, and on the river Sebeto, in the immediate vicinity of Mt. Vesuvius, and not far from the sites of Herculaneum and Pompeii, 118 m. S. E. of Rome, with which it is connected by railway; lat. 40° 51' N., lon. 14° 15' E.; pop. in 1872, 448,335. The approach to Naples from the sea is famous for its loveliness. The entrance of the bay, from Cape Miceno on the N. W. to Cape Campanella on the S. E., has a width of about 20 m., with a circuit of about 35 m., and an indentation of about 15 m. It is well sheltered, and has good anchorage with seven fathoms of water. At the N. W. entrance are the islands of Ischia and Procida, and at the S. E. the island of Capri, while on the N. shore the city rises in an amphitheatre. On the E. side Mt. Vesuvius is in full view, and numerous towns and villages line the shore. The beauty of the bay has been celebrated by ancient and modern writers, and it is the subject of numerous fine paintings. The city has five principal land entrances, but it is open like London and New York, provided only at the leading avenues

with barriers for the purpose of collecting the *gabelle* or duties on provisions. It retains only a few fragments of its mediæval fortifications. Its three castles and modernized gates are surrounded by streets and houses, and are now within the city. It is divided into two amphitheatre-like crescents by a ridge, running N. and S., which forms the hills of Capodimonte, Sant' Elmo, and Pizzofalcone, terminating on the south in a small island occupied by the *castel dell' Ovo*, and joined by a causeway to the mainland. The crescent E. of this ridge includes the bulk of the population, the most ancient part of the city, and the principal edifices and public institutions, extending E. to the river Sebeto, and intersected from N. to S. by a long thoroughfare, the lower portion of which forms the *strada di Toledo*. On a depression between the Capodimonte and Sant' Elmo hills are the suburbs La Sanità and L'Infrascata, and on the slopes of the former the suburbs Dei Miracoli and Le Vergini. The crescent W. of Sant' Elmo is the modern city, known as the Chiaia or quay, connected with the E. portion by the streets occupying the depression between Sant' Elmo and Pizzofalcone, and by a broad avenue which bears successively the names of Gigante, Santa Lucia, Chiatamone, and Victoria, and which runs along the shore at the foot of Pizzofalcone from the palazzo Reale on the east to the

villa Nazionale, formerly villa Reale, on the west. Another broad street, Riviera di Chiaia, passes along the whole length of the Chiaia; and at its W. extremity are the suburbs of Piedigrotta and Mergellina. The length of Naples, from the Sebeto bridge on the east to the Mergellina suburb on the west, is 4 m.; the breadth, from the Capodimonte hill on the north to the *castel dell' Ovo* on the south, is 2½ m. The streets are generally straight, and paved with square blocks of lava; the large thoroughfares are lighted with gas, but only the principal of them have a sidewalk. The majority of the houses are divided into separate tenements. The ground story consists of a series of arched cells, all of the same shape and size, occupied generally by tradesmen or for cafés or restaurants; and on the upper floors lodge numbers of families. The Neapolitans live much out of doors, and it is nothing unusual to see the children washed and dressed, and other domestic scenes of a more or less delicate nature enacted, in the open street. The *strada di Toledo*, the main artery of Naples, was built in the 16th century by Pedro de Toledo, on what was the western fosse or ditch of mediæval Naples, which it separates from the modern city. It runs N. and S. for about 1½ m., from the end of the *strada di Santa Lucia*, near the royal palace, to the museum, but is hardly 60 ft. in width, while it



Naples.

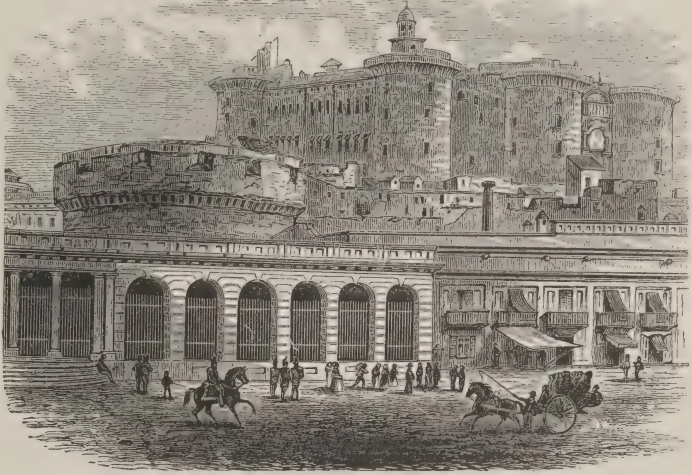
is bordered by houses five to seven stories high. The *strada del Duomo*, nearly parallel to the Toledo, was commenced in 1870, leading directly to the sea, and promising to be one of the finest streets in the city. Few of the other streets exceed 30 ft. in width, and many

are not above 15 to 20 ft., while some are still narrower. The balconies of most of the houses and the booths and stalls give the streets an appearance of being still more contracted than they really are. The Santa Lucia was rebuilt and enlarged in 1846, and contains one of the

markets for fish, especially for shell fish and oysters, which are in great demand. In January, 1868, a land slide destroyed a number of houses at the foot of Pizzofalcone.—Naples possesses hardly any squares. There are a few public places called until recently *larghi*, but now designated as *piazze*, some of which are decorated with fountains and statuary. Of these the piazza del Mercato is occupied by a great market twice a week. It was the scene of the insurrection of Masaniello. The piazza del Plebiscito, called before 1860 the largo del Palazzo, occupies the site of four monasteries removed in 1810; it contains equestrian statues of Ferdinand IV. (I.) of Bourbon and Charles III., the latter having been originally modelled for a likeness of Napoleon, then altered to Murat, and finally to Charles III. The piazza

del Municipio, formerly the largo del Castello, is the largest in Naples, and contains a celebrated fountain erected by the duke of Medina Celi. The villa Nazionale is the fashionable promenade, and may be said to form part of the Riviera di Chiaia. It is 5,000 ft. long and 200 ft. wide, planted with evergreens, oaks, and acacias. It was laid out in 1780, and enlarged in 1807 and 1834. The early part of it is in the Italian style, and the additions are in the Egyptian, and contain two temples dedicated to Virgil and Tasso, winding paths, grottoes, and a terrace extending into the sea. The sea air proved so injurious to the statuary, that the famous Farnese bull was removed to the museum, and replaced in 1825 by the large granite basin from Paestum which forms the central fountain. Other remarkable statues have also since been taken away, and replaced by mediocre copies of celebrated works of antiquity. The Molo is a favorite resort of the seafaring classes. The popular minstrels, or *cantatori*, who formerly frequented it, have removed to the Marinella, a long open beach, once the resort of the lazzaroni. The latter class has lost its ancient characteristic features, being composed mainly of industrious boatmen and fishermen, though they still preserve their fondness for lying on the beach and basking in the sun.—Prominent among the public buildings of Naples are the castles. The castel Nuovo, with its massive towers and fosses, is situated near the port. The triumphal arch, erected in honor of the entry of Alfonso of Aragon into the city in the 15th century, is remarkable for its classical

style, and stands between two of the old broad and massive Anjou towers. It is entered by bronze gates, sculptured in compartments representing the victories of Ferdinand I.; they are the work of the monk Guglielmo. Within are the barracks and a magnificent hall, now



Castel Nuovo.

used as an armory, but formerly for a royal reception room, and for state festivals. A covered gallery connects the fort with the palace. Adjoining the castle and the royal palace are the dockyard and arsenal. Iron-clad and other vessels of the Italian navy are frequently stationed here. The castel dell' Ovo, in the southernmost part of the city, is of oval form, and defended by bastions and outworks. It was much enlarged by Charles I., and is now chiefly used as a prison. The castel Sant' Elmo, the most commanding point in the city, was built in its present form by Pedro de Toledo, and is said to abound with mines and subterranean passages, which, together with the counterscarp and fosses cut in the solid tufa, and its formidable walls, made it of great strategical importance. It has been dismantled under the new régime, and is used as a military prison. Its ramparts afford a splendid prospect of the city and bay. The castel Capuano was once the residence of the Swabian and occasionally of the Anjou dynasty; it is now the seat of the tribunal of commerce, and of the principal courts of criminal and civil law, and contains a prison on the ground floor, unbaptly celebrated under the Bourbons. The castel del Carmine was fortified after the revolt of Masaniello, when it was the stronghold of the insurgents, and is now used as a military prison and barracks. The *palazzo del municipio* was begun in 1819 and completed in 1825 for the purpose of conducting all the public business in one building. It contains 6 courts, 846 apartments, and 40 corridors, covering 200,000 sq. ft. of ground. There are many fountains, some of

which are highly adorned. The chief aqueduct, which supplies them with water, is the *Acqua di Carmignano*. The *Acqua della Bolla* supplies the lower quarters of the city. The supply is, however, limited. Two artesian wells have been sunk, but without success; and an English firm secured a concession for supplying the city with water in 1873. There are two mineral springs in the city of great celebrity.—The number of churches is over 300. The most important is the cathedral, which retains little of its original Gothic character excepting in the towers. It was commenced at the end of the 13th century and completed at the beginning of the 14th; was injured by an earthquake in the middle of the 15th, and was rebuilt by Alfonso I.; and has since undergone frequent restorations, the last in 1837. Over the great entrance are the tombs of Charles I. of Anjou, Charles Martel, and his wife Clementia of Hapsburg. It also contains the tombs of King Andrew, of Pope Innocent IV., and of other noted personages. Opposite to the entrance of the basilica of Santa Restituta, on the site of a temple of Apollo, and once the place of worship for the Greek ritual, but now part of the cathedral, is the *cappella del Tesoro*, or chapel of San Gennaro (St. Januarius), with the two celebrated vials said to contain the blood of that saint, the liquefaction of which gives occasion for the greatest religious festivals of Naples. (See JANUARIUS, SAINT.) The "Tomb of San Gennaro," with the sick waiting to be cured, and several other paintings and frescoes in the chapel, are by Domenichino. The tomb is under the high altar in the richly ornamented subterranean chapel called the "confessional of San Gennaro," near the kneeling statue of Cardinal Carafa, which is said to have been executed by Michel Angelo. The church of Sant' Aniello a Capo Napoli, or Sant' Agnello Maggiore, in the piazza Sant' Agnello, has a painting of San Carlo by Caracciolo, said to be one of the most masterly imitations of Annibale Carracci. Beneath the richly decorated church de' Santi Apostoli, said to have been founded by Constantine on the ruins of a temple of Mercury, is a cemetery containing the tomb of the poet Marini. Among the other churches are Santa Chiara, with a Latin inscription over the Gothic tomb of King Robert the Wise, attributed to Petrarch, designed like many other monuments by Masuccio II.; and the church of San Lorenzo, associated with one of the stories of Boccaccio, with Petrarch, who resided for some time in the cloister attached to it, and with Alfonso I., who in the chapter house of this church proclaimed his natural son Ferdinand heir to the throne by the title of duke of Calabria. The convent and church of San Martino is celebrated for the magnificence of the view from it, as well as for the beauty of its architecture. Santa Maria del Parto, in the Mergellina suburb, called by the common people *il diavolo di Mergellina*, derives its name from Sannazzaro's poem *De Partu Virginis*, and

contains that poet's tomb.—Beggars abound in Naples in spite of the law. There are about 60 institutions devoted to charitable purposes. The most celebrated of them is the *albergo de' poveri* or *reclusorio*, an immense institution, which with its dependencies accommodates more than 5,000 persons. It is over 1,000 ft. long, but was intended by its founder Charles III. to cover a still larger ground, to serve as an asylum and an educational establishment for all the poor of the kingdom. To some extent it is made to answer this purpose; boys and girls are educated there and brought up to trades, and the boys generally enlist in the army. The greatest among the other hospitals is the *santa casa degl' incurabili*, or hospital for incurable diseases, but open to the sick of all descriptions; it is in high repute as a medical school, and accommodates about 2,000 patients. The hospital dell' Annunziata is chiefly intended for the reception of foundlings. There are annually about 2,000 foundlings out of 15,000 births, and they are better cared for in Naples than in other parts of Italy. The new hospital di Gesù Maria is the great clinical school attached to the university. The latter in 1873 contained 74 professorships and 1,500 students, and has a library of about 25,000 volumes. The Chinese college, founded by Father Ripa, a missionary in China, is intended for the training of young Chinese, who, after having completed their education, are employed as missionaries in their native country. The college of music, in which Bellini was educated, enjoys a high reputation, and has had for its directors Zingarelli and Mercadante. It gives free instruction to 100 pupils, and admits others at a small remuneration. The national school of medicine and surgery is attended by upward of 120 students, contains a pathological museum, and communicates by a subterranean passage with the practical medical school at the hospital for incurables. The public primary schools are still in a very unsatisfactory condition, numbering in 1872 only about 15,000 pupils.—The *società reale* comprises academies of science, of archæology, and of the fine arts, and the two former publish their transactions. The observatory of Naples, situated on the Capodimonte hill, about 500 ft. above the sea, is an elegant building, completed in 1820, after the plans of Piazzini, under whose direction it achieved great celebrity. The botanic garden was completed in 1818, and is remarkable for its collection of trees. The most notable new institution is the zoological garden, established in 1873, with one of the finest aquariums in the world. Naples possesses five public libraries: the Nazionale, of 200,000 volumes and 5,000 manuscripts; the Brancacciana, of 75,000 volumes; the university library; the Girolomini; and the *biblioteca del municipio*. The glory of Naples, however, is the museum, situated in a building originally intended for cavalry barracks, afterward remodelled from the designs of Fontana for the use of the university, and

for some time the seat of the academy of science. It is still called *palazzo degli studii pubblici*, or simply *studii*. The name *museo reale borbonico* was given to it by Ferdinand IV. (I.), who, after its enlargement in 1790 for the purpose of receiving the royal collection of art, caused all the antiquities and pictures in the royal palaces of Portici and Capodimonte to be brought into it in 1820. After the annexation of Naples to the Italian kingdom it was named *museo nazionale*. It contains collections of ancient frescoes, mosaics, and mural inscriptions, Egyptian antiquities, ancient sculptures, inscriptions, bronzes, glasses, pottery, cinquecento objects, papyri, gems, medals and coins, vases, paintings, and the national library. Among the ancient frescoes are more than 1,600 specimens found at Herculaneum and Pompeii. The collection of ancient sculpture contains the statues of the Roman emperors and a colossal bust of Julius Cæsar. The "room of the papyri" includes more than 1,700 rolls of writings from Herculaneum, disfigured by the effects of the fire, of which about 500 have been successfully unrolled. Several volumes of transcriptions from them have been published. The gallery of paintings was rearranged in 1866-'7. It contains 500 works, many of them masterpieces of the old painters; while the Neapolitan school can nowhere be studied so well as here. The best paintings are arranged in four rooms, apart from the main collections of the several schools, with some remarkable engravings, and drawings by the great masters.—The private palaces of Naples are far inferior in architectural beauty to those of Florence and other cities of upper Italy, but almost all of them contain museums of works of art. The most beautiful private palace is the palazzo Gravina, in the strada di Monte Oliveto, built at the end of the 15th century by Ferdinando Orsini, duke of Gravina, after the design of Gabriele d'Agnolo; it is now the property of the government, and used by the general post office and telegraph offices. The palazzo Piana, near the church of San Paolo, was the residence of the poet Marini. The palazzo Santangelo is remarkable for its fine statuary and collection of coins and medals, illustrative of the numismatic history of the Two Sicilies. The palazzo Monticelli, a fine specimen of the domestic architecture of the 15th century, was long the residence of the mineralogist Monticelli, whose collection of Vesuvian productions was purchased by the university and the British museum after his death. Naples abounds with fine villas, some of them commanding superb views on the bay. In its immediate environs are the grotta di Pozzuoli or di Posilippo, consisting of a tunnel about 2,250 ft. long and 21½ ft. wide, excavated in the older volcanic tufa, and containing near the top of the entrance the celebrated Roman columbarium known as the tomb of Virgil. The environs abound with many other remarkable sights, interesting to

the classical scholar, archæologist, and naturalist, as well as to the admirers of the beautiful and picturesque in nature, the vicinity of Vesuvius and other volcanic localities presenting scenes of matchless grandeur.—The principal places of amusement are the theatres. The San Carlo, adjoining the royal palace, was long the largest Italian opera house in the world. It was designed, by order of Charles III., by Medrano, a Sicilian artist, built in the short space of eight months by Angelo Carasale, a Neapolitan architect, and opened in 1737. It was burned down in 1816, but rebuilt after seven months without altering the original form. It has six tiers of boxes of 32 each, and the pit accommodates more than 1,000 persons. The teatro del Fondo, in the strada Molo, is under the same management as the San Carlo, and is exclusively devoted to operas and ballets. The oldest theatre in Naples is the teatro de' Fiorentini, now the popular stage of the Italian drama. The opera buffa is represented chiefly in the teatro Nuovo. The teatro Partenope is a popular theatre, in which farce and comedy are performed twice a day in the Neapolitan dialect. The theatre of San Carlino is the home of Pulcinello. The performances take place in the morning and evening in the Neapolitan dialect, and are attended by all classes of the population.—The scholars and savants, artists, jurists, medical men, and the higher middle and professional classes of Naples generally, constitute a very intelligent and refined society; and its men of science and scholars are celebrated in Italy for their devotion to their respective branches of study. The number of strangers is great at all times, but particularly during the winter, notwithstanding the frequently dangerous effect of the climate upon foreign constitutions, especially upon consumptive patients.—Naples has three ports: the Porto Piccolo, the last remains of the ancient port of Palæopolis, and now only suited to small craft; the Porto Militare, a new harbor with a depth of water of five fathoms, bounded N. by the Porto Grande and S. by a mole which runs in a S. E. direction into the sea for a distance of 1,200 ft.; and the Porto Grande, the principal port, but with only three or four fathoms in its deepest part, having suffered from the silting of the sand and shingle. Between the Porto Grande and Porto Piccolo is the *immacolatelle*, with the offices of a branch of the board of health and the captain of the port. On the other side of the Porto Piccolo is the custom house. New docks are projected. The Mandracchio district, S. E. of the latter port, is inhabited by the dregs of the Neapolitan population. The principal imports of Naples are sugar, coffee, and other colonial produce; coal, salted fish, cotton (the cultivation of which has of late enormously increased in the surrounding region), woollen, silk, and flax goods; iron, tinware, and hardware. The chief exports are products of the surrounding

country, chiefly consisting of staves, coral, olive oil, tartar and wine lees, madder, liquorice, hemp, and fruits, and amounting in 1873 to nearly \$9,000,000; imports, chiefly colonial products, cotton, woollen, and silk goods, fish, grain, and metals, nearly \$25,600,000. The shipping comprised 4,703 inward and 4,724 outward vessels, tonnage 1,020,758 and 998,421. There are several great banks, and most of the business men are more or less interested in financial schemes, which are often carried on in a reckless manner. Many banks recently established without adequate capital have resulted in bankruptcies and financial chaos. Merchants are arranged by the chamber of commerce into five different classes, and credit to a certain amount at the custom house for the payment of duties is granted to them accordingly. The most important manufacture is of macaroni and vermicelli, which constitute the principal food of the people. Next in importance is the production of silk goods, the *gros de Naples* taking its name from the manufacture of this city. There are also iron and glass works, type foundries, and manufactories of carpets, broadcloth, chemicals, soaps, perfumery, artificial flowers, corals, porcelain, hats, carriages, gloves, &c.—For municipal purposes the city is divided into 12 districts. There is a garrison of 6,000, and the national guard numbers 14,000. The prisons of Naples have had an infamous reputation, but have been much improved of late years. The most important have already been mentioned.—The principal antiquities of Naples are the catacombs, which are of greater extent than those of Rome. (See CATACOMBS, vol. iv., p. 95.) The environs abound with celebrated relics of antiquity, but in the city proper there are not many of them, excepting the fragments of the temple of Castor and Pollux, of the Julian aqueduct, now called *Ponti Rossi*, and a few other remains. The greatest authority on Neapolitan inscriptions is Mommsen's *Corpus Inscriptionum Neapolitanarum* (Leipsic, 1851).—Several of the learned Neapolitan antiquaries claim for Naples a Phœnician origin, but it is generally considered to have been originally a Greek city and colony of Cumæ, although the account of its first foundation, under the name of Parthenope, is regarded by many authorities as a mythical tradition. According to several accounts the city was, after its increase through settlers from various parts of Greece, divided into an old town (Palæopolis) and a new town (Neapolis). But the identity of the connection between the two names is not yet clearly established. Niebuhr places the situation of Palæopolis near the site of the present town of Pozzuoli, and Livy refers to them as close to each other; but long before his time (330 B. C.) Palæopolis is mentioned as having been engaged in hostilities with Rome, and the name seems soon afterward to have disappeared from history, and to have become merged in Neapolis, which early became

a faithful ally and dependency of Rome, and noted for the courage of its citizens from their successful resistance to the attack of Pyrrhus in 280 B. C., while the strength of its fortifications caused Hannibal to leave the place unmolested during the second Punic war. It retained to a far greater extent than other Italian cities its Greek culture and institutions, and many of the higher classes of Romans resorted to Neapolis for their education, on account of the beauty of the climate and the scenery, and of its hot springs. It recovered quickly from the calamities of the civil war of Marius and Sulla. Under the empire it continued to be a favorite resort of the Roman nobility. Nero made his first public appearance as an actor on the stage of Naples, and the voluptuous character of the city caused it to be called by Ovid *in otia natam Parthenopen*. The great tunnel under Posilippo was then as now an object of admiration. The chief glory of the city was its association with Virgil, who resided there for a considerable period. Naples was taken by the Goths in A. D. 493, retaken by Belisarius in 536, and reduced and dismantled by Totila in 543. About 570 it was constituted a separate duchy, forming a dependency of the exarchate of Ravenna. After the fall of the exarchate in the 8th century it enjoyed for about 400 years an independent government under dukes of its own election, though often engaged in hostilities with the Lombard dukes of Benevento, to whom it was obliged to pay tribute. When the duchy of Benevento was divided into three principalities, the prince of Capua endeavored to gain the supremacy, and succeeded in temporarily seizing Naples (1027); but the Normans, having conquered all the rest of southern Italy and Sicily, reduced Naples after a protracted siege; and the city submitted to Roger I. of Sicily about 1137. On the extinction of the Norman dynasty in 1189, Naples became subject to the house of Swabia. In 1268, under the Anjou dynasty, Naples superseded Palermo as the seat of the government. In 1442 the last king of the Anjou dynasty was conquered by Alfonso of Aragon. Charles VIII. of France conquered Naples in 1495, but was driven out by Gonsalvo de Cordova. Under the Aragonese and Spanish kings it was ruled by viceroys till the peace of Utrecht (1713), when it was annexed to the possessions of the house of Hapsburg. The popular insurrection under Masaniello took place in 1647. Charles, son of Philip V. of Spain, became master of the city and kingdom in 1734, and founded the Bourbon dynasty. The French took it in 1799 and again in 1806. Joseph Bonaparte was made king of Naples, but was replaced in 1808 by Murat, who was displaced by the Austrians in 1814, when the Bourbons were restored. The city was the scene of a revolutionary conflict on May 15, 1848. It was entered by Garibaldi in September, 1860, and incorporated with the dominions of Victor Emanuel. Naples has been often alarmed by

earthquakes, and a severe eruption of Vesuvius in April, 1872, resulted in the loss of some 200 lives, and the city was covered with a shower of ashes. A railway to the summit of Vesuvius was commenced in 1875.

NAPÓ, a river of South America. See ECUADOR, vol. vi., p. 394.

NAPOLÉON BONAPARTE. See BONAPARTE.

NAPOLÉON-VENDEE, a town of France, capital of the department of Vendée, on the river Yon, 231 m. S. W. of Paris; pop. (including the suburb of Roche-sur-Yon) about 9,000. It consists of several streets crossing each other at right angles, nearly all ending in the place Royale, a spacious square, bordered by ranges of pine trees, and surrounded by public monuments and fine mansions. It is situated upon an open heath, and has few manufactures and little trade. The town occupies the site of a large feudal castle built prior to the crusade, which was destroyed by the republicans in 1793. In 1805 Napoleon selected the place as the site for the capital of the department, and devoted 3,000,000 francs to the erection of public edifices, giving to the new town the name which it now bears. Under the restoration it was called Bourbon-Vendée.

NAPOLI DI ROMANIA. See NAUPLIA.

NAQUET, Alfred Joseph, a French chemist, born in Carpentras, Oct. 6, 1834. He completed his studies in Paris, where he took his medical degree in 1859. In August, 1863, he was named professor at the school of medicine, to enter upon his duties in November, 1865. In the interval he was employed by the Italian government in establishing a professorship of chemical and physical sciences in the national technical institute at Palermo. After lecturing on organic chemistry in the medical faculty of Paris till 1867, he incurred 15 months' imprisonment and a fine for having been one of the organizers of the congress at Geneva, and having submitted to it a resolution calling the first Napoleon the greatest malefactor of his day. In March, 1869, he was again arrested and fined on account of his opposing the rites of marriage (his own marriage had been celebrated in 1862 without the attendance of a clergyman) in his publication entitled *Religion, propriété, famille*, in which however he defended the rights of property. After the revolution of Sept. 4, 1870, he was military secretary to the government at Tours and Bordeaux. His election to the assembly, Feb. 8, 1871, being contested by the monarchists, he was reelected, July 2, by a large majority. Among his scientific works are: *Principes de chimie fondés sur les théories modernes* (1865); *De l'atmicité* (1868); and *Précis de chimie légale* (1872). His chief political work is *La république radicale* (1873).

NARBONNE (anc. *Narbo Martius*), a city of Languedoc, France, in the department of Aude, near the Mediterranean, with which it is connected by a canal, 33 m. E. of Carcassonne, and 54 m. S. W. of Montpellier; pop. in 1866,

17,172. The most remarkable edifices are the cathedral of St. Just, a handsome Gothic structure founded in the 13th century; the church of St. Paul, an ancient building in the Romanesque style; and the hôtel de ville, formerly the archiepiscopal palace, one of the towers of which dates from the 14th century. Within it Louis XIII. signed the order for the arrest of Cinq-Mars and De Thou. The seat of the archbishopric has been transferred to Toulouse. There are important manufactures of verdigris, linen, woollen, and leather, and trade in wine, and in honey celebrated for its whiteness.—*Narbo Martius* was founded by the Romans in 118 B. C. Many of the soldiers of Cæsar's tenth legion having been settled there at the end of the civil war, it was thence frequently called *Decumanorum Colonia*. It was taken by the Saracens in 719, and held by them for nearly half a century. In the middle ages it was one of the most flourishing towns in France, containing more than 40,000 inhabitants. No building of the Roman period now exists, the ruins having been used in the construction of the city walls, in which about 500 Roman bass reliefs, friezes, and inscriptions were visible, besides Saracenic ramparts. The walls were pulled down after 1865, and many of the ancient sculptures are gathered in the museum. Varro, the Latin poet, and the Roman emperor Carus, were born in or near Narbonne. One of the four provinces of Gaul, as divided by Augustus, was called from this city *Gallia Narbonensis*.

NARBONNE-LARA, Louis, count de, a French soldier, born at Colorno, in the duchy of Parma, Aug. 24, 1755, died in Torgau, Germany, Nov. 17, 1813. He was educated with the French princes, became a colonel in 1780, and was employed in the ministry of foreign affairs under Vergennes. In 1789 he became very popular at Besançon, where in 1790 he was placed in command of the national guard; but he was always loyal to the royal family. He accompanied the king's aunts when they left Versailles in 1791, and, after seeing them safe out of France, returned to Paris. He was appointed minister of war, Dec. 6, 1791, but was dismissed in March, 1792, and joined the army. After the attack on the Tuileries, Aug. 10, 1792, when he was present in the capital and displayed great courage, he fled to London, where he wrote a memoir to the convention in behalf of Louis XVI. He returned to France in 1800, and was restored to his rank as general of division in 1809. He accompanied Napoleon as special aide-de-camp to Russia, was ambassador to Vienna in 1813, minister to the congress at Prague, and finally military commander at Torgau.

NARCISSUS. 1. A mythical youth, son of the river god Cephissus and the nymph Liriope, who was remarkable for his beauty, but wholly inaccessible to love. The nymph Echo died of grief because he would not reciprocate her affection. One of his rejected admirers begged

Nemesis to punish him, and the goddess caused him to fall in love with the reflection of his own figure in a spring. Under the influence of this passion he pined away, and after death was changed into the flower which bears his name. **II.** A freedman and secretary of the Roman emperor Claudius, who was completely subject to his influence. For some time he used his power in subservience to the wishes of the empress Messalina; but when he found that she meditated his destruction, he determined to anticipate her, and, revealing to Claudius her marriage with Caius Silius, convinced him that his own safety required her immediate sacrifice. The emperor consented to her imprisonment, but as he manifested reluctance to have her put to death, Narcissus sent a tribune to despatch her. Agrippina, whose intrigues in favor of her son Nero Narcissus had thwarted, had him removed to Campania, where he was murdered by her orders, A. D. 54. He is said to have amassed a fortune of 400,000,000 sesterces, equivalent to \$13,500,000. **III.** A Roman athlete, with whom the emperor Commodus was in the habit of contending in the arena, and who was afterward employed by Marcia to strangle his patron. For this crime Septimius Severus, on his accession (A. D. 193), had him given to the lions.

NARCISSUS, the common as well as the botanical name of a genus of popular garden flowers. It is often said that the name is from that of the youth of Grecian mythology who was turned into the flower. Prior regards this as "an instance, among many more, of a legend written to a name," and considers it to be derived from *ναρκάειν*, to become dumb, as it had the reputation of causing torpor or heaviness by its perfume. The genus belongs to the amaryllis family, and consists of bulbous-rooted plants, with flat or channelled, linear leaves, an often compressed or angular scape or flower stalk, at the top of which is a spathe, which bursts at one side and liberates one to several flowers. The tube of the perianth (calyx and corolla together) is prolonged above the ovary, with six equal spreading divisions; stamens six, of unequal length, included in a cup-shaped or tubular white or colored crown, which springs from the corolla-tube at their base; ovary three-celled, with a simple style and an obtuse stigma. This genus, which is mainly south European, extending into Asia, has been divided by some botanists in a most perplexing manner. While some regard it as containing only a few species, others, upon trivial characters, have made some 15 genera, with about 100 species. In popular nomenclature the genus is divided into narcissus, jonquil, and daffodil. Those recognized as narcissuses have a very short, cup-like crown to the flower. One of the best known of these is the poets' narcissus (*N. poeticus*), large clumps of which are common in old gardens; the scape, about a foot high, bears but a single flower, of the purest white color, yellowish at the throat, the

small crimped crown with a bright pink or scarlet edge; there is a double variety in which the crown disappears; this species, which is very fragrant, especially when double, is a



Poets' Narcissus (*N. poeticus*).

native of southern Europe from France to Greece. The two-flowered narcissus (*N. biflorus*) is also a native of the south of Europe, but has become thoroughly naturalized in England, and is thought to be native to some parts of that country; it has two white or pale straw-colored flowers to each stem, the flowers having a short yellow crown; this is also sweet-scented, and is the primrose peerless and pale daffodil of the old gardeners. The hoop-petticoat narcissus (*N. bulbocodium*) has its leaves and flower scapes 6 to 9 in. long; the solitary bright flower is 1½ to 2 in. long, with a very



Two-flowered Narcissus (*N. biflorus*).

conspicuous cup, which widens rapidly toward the brim; it is an exceedingly neat and pretty species for the border or for pot culture. The most prized of all is that known as the poly-

anthus narcissus, which originated from *N. Tazetta*, perhaps crossed with other species; the catalogues give numerous named varieties; in all the bulbs are large, the flat leaves about



Polyanthus Narcissus (*N. Tazetta*).

a foot long, and the flower stem, of about the same height, produces a cluster or umbel of six to ten large very fragrant flowers; in the different varieties corolla and cup are both of different shades of yellow, or the one is white while the other is yellow, and in some the cup is double. While this is the finest, it is the most tender of all; but in the climate of New York city, if planted 6 in. deep, and covered with litter, it flowers freely in spring. It is very popular for forcing for winter blooming.—The species known as jonquil (dimin-



Daffodil (*Narcissus pseudonarcissus*).

tive of Span. *junco*, from Lat. *juncus*, a rush) is *N. jonquilla*, which has narrow rush-like or half cylindrical leaves, which with the flower scapes are about a foot long; flowers two to

five, small, yellow, and fragrant; there is a double variety. The daffodil, which in England more than in this country is called daffodilly and daffadowndilly, derives its name from *asphodelus*, through affodilly, &c.; the species generally known by this name is *N. pseudonarcissus*, which has flat leaves and the scape bearing a single large flower having a large crown or cup; in the typical form the cup and petals are of a uniform yellow color, but in the variety *bicolor* the petals are white and the cup yellow, and there are several other varieties, including double and dwarf ones. One of the plants known by the garden name of "butter and eggs" is the double form of the incomparable daffodil (*N. incomparabilis*), in which large lemon-colored petals are intermingled with smaller orange-colored ones. There are several other species, but they are rarely seen in ordinary cultivation.—The common poets' and two-flowered narcissus, the jonquil, and daffodil are very common in gardens, especially in country places, where they remain in the same place year after year, and form large clumps which show a small number of flowers for the quantity of foliage; being so hardy, they are left to themselves until the soil about them becomes filled with bulbs and roots and completely exhausted. To have them flower satisfactorily the clumps should be taken up in autumn, divided, and set in fresh soil. The treatment of the tender sorts is indicated under POLYANTHUS. The method of forcing in pots is the same as for similar bulbs (see HYACINTH). The varieties of polyanthus are those most generally seen in window culture, but the commoner species are bright and welcome in winter, and might be more generally used for indoor blooming than they are. The gardeners near New York and other cities force great quantities of the poets' narcissus, daffodils, &c., and send them to market in early spring in full bloom.

NARCOTICS (Gr. *νάρκη*, torpor), substances which when taken into the blood affect all parts of the nervous system, but especially the higher nervous centres, in the direction of paralysis. A primary stage of stimulation sometimes precedes the true narcotic effect, but much of what is called stimulation, as for instance the noisiness or restlessness of alcohol, is in reality the beginning of narcotism, being due to a gradual removal of the restraints imposed by the higher faculties, by custom, or by timidity, upon the lower impulses. In the later stages of narcotism the faculties of sensation, of voluntary and reflex motion, are abolished, and death may result from paralysis of the centres that govern the circulation and respiration. Familiar examples of this class of drugs are opium, alcohol, and chloroform. The symptoms of narcotism manifested by special drugs are described under the titles of those drugs, and to them the reader is referred.

NARCOTINA. See OPIUM.

NARD. See SPIKENARD.

NARES. I. James, an English composer, born at Stanwell, Middlesex, in 1715, died in 1783. He was educated as a chorister at King's chapel, London, under Bernard Gates and Dr. Pepusch. In 1734 he was appointed organist of York cathedral, in 1756 organist and composer to George II., and in 1757 master of the choristers in the chapel royal. The last named office he resigned in 1780. He composed several anthems and services for the royal chapel, and published "Twenty Anthems in Score," which is still in constant use in the cathedrals of England and Ireland. He also published "The Royal Pastoral, a Dramatic Ode," and "A Collection of Catches, Canons, and Glees."

II. Robert, an English author, son of the preceding, born in 1753, died in 1829. He was educated at Oxford, took orders in 1778, and became rector of Sharnford, Leicestershire, and preacher at Lincoln's Inn. Subsequently he was assistant librarian at the British museum, became archdeacon of Stafford, and held other preferments. He published "Elements of Orthoëpy" (1784); "A Connected and Chronological View of the Prophecies relating to the Christian Church" (1805); "The Veracity of the Evangelists Demonstrated" (1815); and a "Glossary of Words, Phrases, &c., which have been thought to require illustration in the works of English authors" (4to, 1822; new ed., edited by J. O. Halliwell and T. Wright, 2 vols. 8vo, 1859). With Mr. Beloe he founded the "British Critic," which he edited for four years.

III. Edward, an English author, cousin of the preceding, born in London in 1762, died at Biddenden, Kent, Aug. 20, 1841. He was educated at Westminster school and at Christchurch college, Oxford, and became a fellow of Merton college in 1788. He took orders in 1792, married a daughter of the duke of Marlborough in 1797, and in 1798 became rector of Biddenden. He was appointed Bampton lecturer in 1805, and professor of modern history at Oxford in 1814. His works are: "On the Plurality of Worlds" (1802); "Evidences of Christianity" (Bampton lectures, 1805); "Remarks on the Version of the New Testament lately published by the Unitarians" (1810); "Thinks I to Myself," a novel (1811); "Discourses on the Three Creeds" (1819); "Elements of General History," a continuation of Tytler's work (1822); "Heraldic Anomalies" (2 vols., 1824); and "Memoirs of the Life and Administration of William Cecil, Lord Burghley" (3 vols., 1828-'31).

NARO, a town of Sicily, in the province and 12 m. E. of the city of Girgenti, on the river Naro; pop. about 11,000. It is of Saracenic origin, and renowned for its picturesque situation, and has a feudal castle bearing the arms of the Chiaromonte family. It contains several churches and other buildings of great antiquity, and has an active trade in sulphur, wine, and oil.

NARRAGANSETT BAY, on the S. E. coast of Rhode Island, extends from Point Judith on

the W. to Seconnet on the E., and N. to Bullock's Point, 6 m. below Providence; it is 28 m. long by from 3 to 12 m. wide. It receives the Pawtuxet, Providence, Pawtucket, and Taunton rivers, and contains a number of islands, the principal of which are Rhode island, Canonicut, and Prudence. It is easily accessible, and affords excellent harbors and roadsteads. Newport, Bristol, Warren, and other towns are on its borders. It is well supplied with lighthouses, and strongly fortified.

NARRAGANSETTS, an Algonquin tribe of American Indians, who occupied the territory now comprised in Rhode Island. They were less warlike and more industrious than the Pequots. They had 12 towns within a distance of 20 m., and were very numerous. In 1621 their chief Canonicus sent to Plymouth a bundle of arrows tied with a snake skin, indicating hostile intentions. Gov. Bradford returned the skin filled with powder and shot, which seemed to have a quieting effect. In 1636 Roger Williams won the Narragansetts to peace, and they made a treaty and cooperated with Mason against the Pequots. In 1644 Gorton induced them to cede their lands to the king. They engaged in hostilities in 1645, but submitted to a treaty Sept. 5, agreeing to pay indemnity to the colonies. In King Philip's war they were suspected of aiding their old enemies the Pokanokets, and a force of 1,000 men, with 150 Mohegans and Pequots, captured and burned their fortress. Canonchet, their chief, then cut off two English parties and destroyed many frontier villages, but was at last taken by Denison and shot. A large force was then sent to crush the tribe. Their chief fortress, on an island in a swamp in South Kingston, was taken after a stubborn fight, and it was estimated that 1,000 men, women, and children were killed; the colonial loss was 230. This war almost exterminated the Narragansetts. The remnant settled at Charlestown, R. I., and prospered. In 1822 there were 407 on their reserve of 3,000 acres, with a missionary, a church, and 50 pupils at school. In 1833 they had declined to 158, only 7 being of pure Narragansett blood. Their language is preserved in Roger Williams's "Key into the Language of America," &c. (London, 1643).

NARSES, a Byzantine general, born about A. D. 473, died in Rome about 568. He was a eunuch and a slave of Justinian, but rendering important services to his master during the riots of "the blue" and "the green" in 532, he was appointed imperial treasurer, and was subsequently sent on several embassies. In 538 he commanded the reinforcements sent to Belisarius, then waging war against the Goths in Italy; but his jealousy of that general, whom he is supposed to have had instructions from Justinian to thwart, paralyzed the Roman arms and led to the capture of Milan by the Goths. Narses was recalled shortly after, and for the next 12 years his name is hardly mentioned in the Byzantine annals; but in the im-

perial councils he continued to exercise a predominant influence. He commanded a second expedition against the Goths in Italy in 552, and near Rome gained a victory over King Totila, who perished with 6,000 of his soldiers. This triumph led to the surrender of Rome and several of the strongest fortresses in central Italy. A vast barbarian army under Teias, the successor of Totila, was soon afterward defeated on the banks of the Sarno, near Naples, after a battle of two days, in which Teias was slain. The Franks and Alemanni, to the number of 75,000, now descended from the Alps, and spread themselves over the whole peninsula. When they had become demoralized and weakened by rapine, Narses attacked them at Casilinum in Campania, on their return northward, with such vigor that out of 30,000 men only 5,000 are said to have escaped. This victory ruined the barbarian power in Italy, which once more became a province of the empire. Narses was rewarded by the appointment of governor of the conquered territory, and ruled at Ravenna with the title of exarch for about 14 years. After the accession of Justin II., being dismissed from office, he invited the Lombards to invade Italy, probably anticipating that he would be restored to power in order to repel them. In this he was disappointed, and he is said to have died of grief at the ruin he brought upon the country.

NARUSZEWICZ, Adam Stanislaw, a Polish historian, born in Lithuania in 1733, died at Janowiec, Galicia, in 1796. He entered the order of Jesuits in 1748, travelled through Germany, France, and Italy, was appointed professor at Warsaw, and became bishop of Smolensk in 1773, and of Luck in 1790. His "History of Poland" (8 vols., Warsaw, 1780 *et seq.*) gained him the surname of the Polish Tacitus. Among his other works are a history of the Tartars, idyls, satires, and other poems.

NARVA, a town and port of European Russia, in the government and 80 m. S. W. of the city of St. Petersburg, on the left bank of the Narova; pop. in 1867, 6,175. It is surrounded with a rampart, and has manufactories of nails, extensive saw mills, and productive fisheries. It was founded in the 13th century, and was formerly a member of the Hanseatic league, and celebrated for its commerce previous to the foundation of St. Petersburg. The inhabitants of Narva proper are nearly all of German descent, while the suburb of Ivangorod is almost exclusively inhabited by Russians. Near this town Charles XII., on Nov. 30, 1700, with an army of 8,500 Swedes, defeated more than 50,000 Russians under Peter the Great.

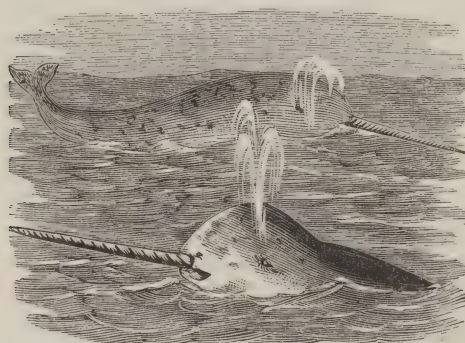
NARVAEZ, Pamfilo de, a Spanish explorer, born in Valladolid about 1480, perished off the southern coast of Louisiana in 1528. He came to America apparently as early as 1501, served in Santo Domingo, and then passed to Cuba, where he stood next in command to Velazquez, the governor. Sent to Mexico to reduce Cortes, he was defeated, lost an eye,

and was confined as a prisoner by Cortes for five years. He then went to Spain, obtained a grant of Florida, and sailed with a large force in 1527. He landed at Tampa bay, April 16, 1528, and marched to Appalache. Finding the country poor and thinly peopled with fierce tribes, he at last made for the coast, built rude boats, and endeavored to reach Mexico. Soon after crossing the mouth of the Mississippi he was blown out to sea in his boat and perished. Most of his force sank under hardship or hostilities, but his treasurer Cabeça de Vaca and others made their way across the continent, and finally reached the Spanish settlement of San Miguel in Sonora in May, 1536. His accounts led to the exploration of New Mexico and California.

NARVAEZ, Ramon Maria, duke of Valencia, a Spanish statesman, born in Loja, Andalusia, Aug. 4, 1800, died in Madrid, April 23, 1868. He was early engaged in military operations, and was wounded during the capture of Castelfolli in 1822. In 1823, when the French army of intervention entered Spain, he retired to Loja, but returned to the army in 1832, and in 1834 was wounded in the battle of Mendi-gorria. In 1836 he acted under the orders of Espartero, and the reputation which he gained by defeating the Carlist general Gomez (Nov. 25, 1836) led to his advancement. In 1838, by his rigorous measures against the brigands who infested La Mancha, he restored tranquility to that province; and he was appointed captain general of Old Castile and general of an army of reserve. He had also been elected to the cortes from Seville, and on the formation in that city of a revolutionary junta by Cordova, he repaired thither to aid that general in his movements against Espartero; but the insurrection was suppressed, and Narvaez was compelled to seek refuge in France (1840). While there he continued his machinations against Espartero, in conjunction with the queen mother Maria Christina; and in 1843, at the head of the Christinos, he landed at Valencia, defeated Gen. Seoane at Torrejon de Ardoz (July 22), and made his entry into Madrid, which led to the overthrow of Espartero. In 1844 he became prime minister, and was created field marshal, count of Canadas Altas, and duke of Valencia. Maria Christina was permitted to return to Madrid, and the opponents of the constitution of 1845 were put down rigorously. His arbitrary disposition gave offence to many members of his own party, and brought him into collision with Maria Christina, and he resigned in February, 1846. After having served for a short time as ambassador in Paris, he was recalled to power in 1847, but was soon dismissed on account of quarrels with the queen mother. On Oct. 21, 1849, he was restored to office, and opposed the British government's attempt to interfere in Spanish affairs with a firmness which led to the withdrawal of the British minister (Sir Henry Bulwer) from Madrid, and to the temporary interruption of

diplomatic relations between the two governments. He resigned Jan. 10, 1851, and became ambassador to Vienna. After Espartero's withdrawal, July 14, 1856, and O'Donnell's brief term of office, Narvaez was again called upon to preside over the cabinet, Oct. 12, but without special office. The concordat of 1851 with the holy see, which had been variously modified, was restored. The outbreak at Malaga on Nov. 16 was put down by force of arms, and a general amnesty to the Carlist rebels of 1855 and 1856 was promulgated, April 8, 1857. Narvaez caused stringent laws to be enacted against the press, and made various dignitaries of church and state *ex officio* members of the senate. Overthrown in November, 1857, he became once more chief of the cabinet in September, 1864; and in January, 1865, he proposed in the cortes the abandonment of Santo Domingo, which was adopted after protracted discussions. In June of the same year his ministry was overthrown; but in July, 1866, he was again prime minister, and held that post till his death.

NARWHAL, a cetacean mammal, of the genus *monodon* (Linn.), frequenting the arctic seas; its popular name is sea unicorn. It has no proper teeth, but in the males, and sometimes in the females, there are two tusks arising from the internaxillary bone; these are true incisors, but only one, usually the left, is developed, the other remaining rudimentary in most cases; the former is long, pointed, spirally twisted and grooved, and directed straight forward, growing through life from a permanent pulp as in the elephant. The tusk, of solid ivory and 6 or 8 ft. long, is a most formidable weapon when wielded by such an active and powerful animal, and is sometimes driven deeply into the timbers of a ship. According to Mulder there are two small teeth in the gum of the upper jaw. In the only well ascertained



Narwhal.

species (*M. monodon*, Linn.) the body may attain a length of 15 or 16 ft., and the tusk from 6 to 10 additional; there is no well marked separation between the head and body; the forehead rises suddenly, and the blow-hole is on the top of the head; the eyes and mouth

are small, and the lips unyielding; the pectorals are small for the size of the animal; the caudal is transverse, bilobed, and about 4 ft. wide; instead of a dorsal fin there is a low fatty ridge 2 or 3 ft. long in the middle of the back. The prevailing color is dark gray above with numerous darker spots, white on the sides and below, on the former with grayish spots; some specimens are very light-colored, and the young are said to be bluish gray. The food consists principally of cephalopod mollusks, and, on the authority of Scoresby, of flat and other fishes, which it transfixes with its horn; other uses of this weapon are for breaking the ice for the purpose of obtaining air, and for defence. Narwhals are sometimes seen in bands of 10 to 20, sporting about whaling ships, elevating their tusks above the water, and playing about the bows and rudder; they are migratory, and their appearance is hailed with delight by the Greenlanders, who consider them the certain forerunners of the right whale; and this, the result of their experience, is probably due to both using the same kind of food. They are harpooned for their ivory, oil, and flesh; the last is considered a delicacy as food by the Greenlanders. The blubber is from 2 to 4 in. thick, and yields a very superior oil. The ivory of the tusk is very hard and white, and takes a high polish; it was formerly a valuable article of commerce, when the origin of the horns was less known; a famous throne of the kings of Denmark is said to be made of the ivory of narwhals' tusks.

NASCAPEES, and **Nehirolini** or **Montagnais**, Indian tribes of Labrador, the most easterly division of the great Algonquin nation. The Nehirolini, called Montagnais by the French Canadians, now occupy the territory from the Saguenay to the straits of Belle Isle; but when the French first settled Quebec they held the valley of the St. Lawrence from above that point. They were always friendly to the settlers, but were driven back by the Iroquois and the want of game to their present location, the Esquimaux retiring before them. The Catholic missions among them established in Champlain's time are still maintained; but they are hunters, and cannot be made cultivators. The caribou is their chief game. They dress well in skins or purchased clothing, but live in wretched cabins of poles covered with bark and branches, often pitched on the snow or damp grounds. La Brosse, the last of the old Jesuit missionaries, taught them generally to read and write, and this knowledge is still maintained by family instruction. They numbered in 1872 about 1,700 in various bands at Point Bleu, Chicoutimi, Moisie, the Seven Islands, Cascapediae, and River Godbout. The Nascapees or Naskapis (*i. e.*, people standing upright) occupy the table land in the interior from Lake Mistassini to the Atlantic. They are shorter and lighter than the Montagnais, with clear-cut features and large eyes. Their language is so near the Montagnais that they

talk with each other without difficulty. They are slovenly in their persons and careless, often in want, and driven even to acts of cannibalism. Missions have benefited some bands only. They telegraph by fires on high places, and mark their routes by poles with bark pendants. They believe in a great spirit and in Atshem, a spirit of evil. The government returns of 1870 put their number at 2,860. These two tribes have been styled by Gallatin and others Sheshapootosh and Scoffies, names unknown in Canada and derived only from an ignorant Micmac boy. Grammars and dictionaries of the Montagnais by missionaries at various dates exist in manuscript, but only devotional works have been printed in the language.

NASEBY, a village of Northamptonshire, England, 12 m. N. N. W. of Northampton, where was fought a decisive battle between Charles I. and the parliamentary forces under Fairfax, June 14, 1645. After the capture of Leicester by the royal army, Fairfax, who was besieging Oxford, marched into Northamptonshire. The two armies, about equal in number, confronted each other on the morning of June 14, the parliamentarians occupying a strong position near Naseby, and the king's troops being drawn up one mile south of Harborough. The royal centre was commanded by the king in person, the right wing by Prince Rupert, and the left by Sir Marmaduke Langdale. Fairfax, supported by Skippon, commanded the centre of his army, with Cromwell on his right wing and Ireton on his left. The royalists made the attack, and Rupert with his cavaliers charged with such fury upon Ireton that his wing was broken and put to flight. Instead of supporting his royal kinsman, Rupert detached himself from the main battle to pursue the fugitives. The royal centre maintained an obstinate contest till Cromwell, having routed the forces of Sir Marmaduke Langdale, fell suddenly upon its rear, when, unsupported by either of its wings, it almost immediately surrendered. One regiment alone held out for the king, but was finally broken by repeated charges. At this moment Rupert returned from his needless pursuit of Ireton's troops, with his men and horses exhausted and the time for effective aid gone by. The king saved himself only by a precipitate flight. The royalists lost 800 killed and 4,500 prisoners, besides their artillery and ammunition; the parliamentarians had 1,000 killed. A number of private letters between Charles and his queen, subsequently published under the title of "The King's Cabinet Opened," also fell into the hands of the victors.

NASH, a N. E. county of North Carolina, bounded S. W. by Contentny creek and N. by Swift creek, and intersected by Tar river; area, 640 sq. m.; pop. in 1870, 11,077, of whom 4,721 were colored. The surface is uneven. The chief productions in 1870 were 8,046 bushels of wheat, 152,506 of Indian corn, 14,356 of oats, 24,907 of sweet potatoes, and 3,697 bales of cotton. There were 845 horses, 444

mules and asses, 1,443 milch cows, 911 working oxen, 2,073 other cattle, 2,619 sheep, and 10,697 swine. Capital, Nashville.

NASH, Joseph, an English water-color painter, born about 1813. He is chiefly distinguished as a painter of architecture, and his "Architecture of the Middle Ages" (fol., 1838), and "Mansions of England in the Olden Time" (4 vols. fol., 1839-49), lithographed in colors from his drawings, are among his works which have been published. He has painted historical scenes from Shakespeare and Scott, and miscellaneous subjects, such as "The Queen's Visit to Lincoln's Inn Hall" (1846), "Charles V. visiting Francis I." (1865), "The Chapel of Edward the Confessor in Westminster Abbey" (1866), and "Louis Philippe's Bedroom at Claremont" (1867).

NASH, Richard, known as Beau Nash, born in Swansea, Glamorganshire, Oct. 18, 1674, died in Bath, Feb. 3, 1761. After a preliminary education at Carmarthen school, he was entered at Jesus college, Oxford, where he displayed some ability, but was chiefly distinguished by dissipation. To preserve him from an imprudent marriage, he was at 17 years of age removed from the university, and his father purchased for him a commission in the army; but wearying of the monotony of barrack life, he entered himself a student of law in the Middle Temple. Instead of studying, however, he devoted himself to pleasure, and with resources supplied from the gaming table he became a leader of fashion and a man about town. On the occasion of an entertainment given by the members of the Middle Temple to William III., he conducted the pageant with so much tact and address that the king offered to knight him; but Nash, sensible of his uncertain means of support, declined the honor. In 1704 he visited Bath, then just rising into importance as a watering place, and the citizens appointed him master of ceremonies. He succeeded in a short time in securing for the place the reputation of an agreeable resort for valetudinarians as well as mere seekers of pleasure. Decency of dress and civility of manners were enforced in the public resorts, an elegant assembly room was built, streets and buildings were improved, and in process of time a handsome city was established in place of what had been only a dull provincial town. Nash himself shared in the prosperity which he had promoted, and, from his influence and the deference in which he was held by citizens as well as visitors, was styled the "king of Bath." Supporting himself still by the gaming table, he lived in great style, travelling in a coach and six with outriders, and dispensing charities with reckless profusion. Toward the close of his life his glory waned, and after the act of parliament against gambling he lived in comparative indigence. He was honored by a public funeral, and a marble statue of him was placed in the pump room of the king's bath. Nash was ungainly in person, with coarse and ugly features, and

dressed in a tawdry style. A life of him by Goldsmith was published anonymously in 1762.

NASH, Thomas, an English dramatist, born in Lowestoft, Suffolk, about 1560, died in London in 1600 or 1601. He took the degree of B. A. at Cambridge in 1584, and in 1589 fixed his abode in London. The prelatists and Puritans being then engaged in a war of vituperation, Nash espoused the cause of the former, and wrote a series of pamphlets including "Pap with a Hatchet," "An Almond for a Parrot," "A Countersuffe to Martin Junior," and "Martin's Month's Minde." He aided Marlowe in writing "Dido, Queen of Carthage," and produced a spectacle styled "Summer's Last Will and Testament," which was exhibited before Queen Elizabeth in 1592. Nash's plays were ill received, and he became very poor. He described his forlorn condition in his "Pierce Penniless, his Supplication to the Divell," which appeared in 1592. He then resumed pamphleteering, and assailed Dr. Gabriel Harvey, who made a stout defence; and finally the archbishop of Canterbury ordered the publications of both to be seized. In 1597 Nash produced a satirical play called "The Isle of Dogs," the representation of which led to his confinement in the Fleet prison.

NASHUA, a city and one of the shire towns of Hillsborough co., New Hampshire, at the junction of the Merrimack and Nashua rivers, 35 m. S. of Concord, and 40 m. N. N. W. of Boston; pop. in 1870, 10,543. The streets are broad, well lighted, and lined with trees, and many of the churches and residences are handsome. Its prosperity depends upon its railroad facilities and its manufactures. The railroads meeting here are the Boston, Lowell, and Nashua; the Concord; the Nashua, Acton, and Boston; the Worcester and Nashua; the Wilton; and the Nashua and Rochester. Water power is obtained from the Mine falls in the Nashua river, from which a canal has been cut, 3 m. long, 60 ft. wide, and 8 ft. deep, with a head and fall of 36 ft. The Jackson company, with 766 looms and 22,000 spindles, produces sheetings and shirtings; the Nashua manufacturing company, with 1,800 looms and 75,000 spindles, manufactures sheetings, shirtings, prints, and flannels; and the Vale Mills manufacturing company, with 4,684 spindles, produces shirtings. There are also extensive iron works, with the largest steam hammer in the United States, soapstone works, and manufactories of bedsteads, carpets, bobbins, spools, and shuttles, cards and glazed paper, edge tools, locks, shoes, marble-working tools and implements, sash, doors, and blinds, &c. The city has two national banks and three savings banks. There are a high school and several grammar, middle, and primary schools, with an average attendance of 1,790; a city library, with about 6,000 volumes; two daily and two weekly newspapers; and 11 churches, viz.: 1 Baptist, 3 Congregational, 1 Episcopal, 2 Methodist, 2 Roman Catholic, 1 Unitarian, and 1 Universal-

ist. Nashua owes its origin to the organization of the Nashua manufacturing company in 1823. It was incorporated as a city in 1853.

NASHVILLE, a port of delivery and the capital of Tennessee, seat of justice of Davidson co., the second city of the state in point of population, situated on the S. bank of the Cumberland river, 200 m. above its junction with the Ohio, a little N. of the centre of the state, and 240 m. S. S. W. of Cincinnati; lat. $36^{\circ} 10' N.$, lon. $86^{\circ} 49' W.$; pop. in 1830, 5,566; in 1840, 6,929; in 1850, 10,165; in 1860, 16,988; in 1870, 25,865, of whom 9,709 were colored and 2,809 foreigners. The river bluffs are here rocky, and rise 70 or 80 ft. above low-water mark. The land on which the city is built is irregular, rising in gradual slopes, with the exception of Capitol hill, which is more abrupt. This eminence is symmetrical, resembling an Indian mound, and overlooks the entire city. Nashville is regularly laid out, with streets crossing each other at right angles, but mostly rather narrow. It is generally well built, and there are numerous imposing public and private buildings. One of the finest of the former is the capitol, situated on Capitol hill, and constructed inside and out of a beautiful variety of fossiliferous limestone. It is three stories high including the basement. At each end there is an Ionic portico of eight columns, each 4 ft. 6 in. in diameter and 33 ft. 5 in. high, and each of the sides has also a portico of six columns. A tower rises above the centre of the roof to the height of 206 ft. from the ground. It has a quadrangular rusticated base, 42 ft. high, surmounted by a circular cell 37 ft. high and 26 ft. 8 in. in diameter, with eight fluted Corinthian columns, designed from the choragic monument of Lysicrates at Athens. The dimensions of the whole building are 239 by 138 ft., and it cost nearly \$1,000,000. It is approached by four avenues which rise from terrace to terrace by broad marble steps. The edifice is considered one of the handsomest public buildings in the country. The court house is a large building on the public square, with an eight-columned Corinthian portico at each end, and a four-columned portico at each side. The market house, also on the public square, is a fine building. The county jail is a substantial structure of stone. The state penitentiary buildings, also of stone, occupy three sides of a hollow square enclosed by a massive stone wall, within which are numerous workshops. The Hermitage, the celebrated residence of Andrew Jackson, is 12 m. E. of Nashville. The city has several lines of street railway. It is lighted with gas, and is supplied with water by expensive works, which raise it from the river to four reservoirs. The Cumberland is navigable below this point for about nine months in the year, and to Carthage, 100 m. above, for about the same time, and for four months to Point Burnside, 260 m. above Carthage, tapping the great Appalachian coal field. At Nashville it is crossed by an



Nashville.

iron railroad bridge, with an immense draw of 280 ft., and two stationary spans, each of 200 ft., and also by a wire suspension bridge. Railroad communication with Louisville, St. Louis, Memphis, Chattanooga, Montgomery, and other points is furnished by the Louisville, Nashville, and Great Southern, the Nashville, Chattanooga, and St. Louis, the St. Louis and South-eastern, and the Tennessee and Pacific lines. These railroads and the river enable the city to command the trade of an extensive and productive region. Its business is rapidly increasing. The value of its wholesale trade in 1873 was as follows:

BRANCHES.	Value.	BRANCHES.	Value.
Cotton.....	\$4,250,000	Cigars and tobacco	\$2,000,000
Leaf tobacco.....	416,320	Live stock.....	1,043,250
Provisions.....	1,900,000	Stoves and tin-	
Dry goods.....	4,000,000	ware.....	750,000
Liquors.....	7,000,000	Furniture.....	500,000
Boots and shoes...	2,000,000	Paper.....	300,000
Hats.....	300,000	Coach and saddle-	
Hardware.....	1,500,000	ry hardware...	250,000
Groceries.....	10,000,000	Saddlery and har-	
Notions and white		ness trade.....	200,000
goods.....	1,300,000	Other manufac-	
Drugs.....	1,600,000	tures.....	2,500,000
Clothing.....	1,200,000	Produce.....	1,069,000
Flour and wheat...	5,000,000	Millinery.....	110,000
Corn and oats.....	688,000	Coal.....	400,000
Salt.....	175,000	Books and station-	500,000
Leather.....	210,000	ery.....	
Hides.....	200,000	Lumber.....	800,000
China, glass, and			
queensware.....	200,000	Total.....	\$51,261,570

Nashville has one large cotton factory, operating in 1875 400 looms and 13,840 spindles, and employing 325 hands; in 1874 it produced 2,628,907 yards, chiefly sheetings. There are seven saw mills, five flour mills, eight planing

mills and sash and blind factories, two cotton-seed oil mills, two tanneries, two manufactories of chairs, four of furniture, three of wagons, four of carriages, one of cedar ware, one of fertilizers, several of mattresses, saddletrees and trunks, brooms, shoes, and clothing, six founderies, six machine shops, two brass founderies, a brewery, distilleries, and paper mills. There are four national banks, with an aggregate capital of \$900,000, a savings bank, and three fire and three life insurance companies.—The city is divided into 10 wards, and is governed by a mayor and a board of aldermen of one member and a common council of two members from each ward. There is an efficient police force and a well organized fire department. The receipts into the city treasury for the year ending Oct. 1, 1874, were \$456,535 80; disbursements, \$461,599 11; city debt, \$1,630,506 22; assessed value of property, \$13,355,281, embracing about two thirds of the property of the city. The principal charitable and reformatory institutions are the state institution for the blind, several hospitals, two orphan asylums near the city, the city workhouse, and a house of industry for females. About 6 m. from the city is the county poorhouse, and about the same distance the state hospital for the insane. Nashville is the seat of several important educational institutions. The university of Nashville was incorporated in 1785 under the name of Davidson academy, and in 1806 as Cumberland college; it received its present title in 1826. The literary department was united in 1855 with the "Western Military Institute," and was conducted on the military plan until the breaking out of the civil war. After its close the Montgomery

Bell academy, an endowed institution, was united with it. The main building is a handsome Gothic edifice of stone. In 1873-'4 there were 9 instructors, 179 preparatory and 44 collegiate students, and a library of 11,000 volumes. The medical department, opened in 1850, also occupies a fine building; it has an extensive museum, and the charge of a mineralogical cabinet of 20,000 specimens collected by Dr. Gerard Troost. The number of instructors in 1873-'4 was 10; of students, 235. The funds and property of the university amount to \$300,000. Fisk university was established in 1866 by several northern gentlemen for the colored youth of the state. The course embraces the common and preparatory branches as well as those of collegiate grade. The number of instructors in 1873-'4 was 13; of students, 424. The Tennessee Central college (Methodist), also for colored people, was established in 1866, and in 1873-'4 had 8 professors and 28 students; it embraces academic, normal, preparatory, collegiate, and theological departments. The Tennessee college of pharmacy, organized in 1872, in 1873-'4 had 5 professors and 20 students. The buildings of Vanderbilt university, named in honor of Cornelius Vanderbilt of New York, who gave \$500,000 for its establishment, are in course of erection. It is under the control of the Methodist Episcopal church, South, and is intended to comprise theological, law, medical, and literary and scientific departments. Other educational institutions are a young ladies' seminary, a select school, and the following under the control of the Roman Catholics: St. Cecilia's academy for young ladies, St. Bernard's academy, and a parochial school. The public schools are graded, embracing a high school department, and are in a flourishing condition. The number of children between 6 and 18 years of age in 1873-'4 was 8,877; number enrolled in public schools, 3,656 (2,820 white and 836 colored); average attendance, 2,520; number of teachers, 70; total expenditures for school purposes, \$75,170 53, of which \$11,000 was for permanent improvements, and \$48,180 25 for teachers' salaries; number of school houses, 6 (4 for white and 2 for colored children); number of sittings, 3,345; value of school property, \$141,000. The state library in the capitol has 20,000 volumes and 5,000 pamphlets, and the city library 6,000 volumes. There are two daily, two tri-weekly, and eleven weekly newspapers, and nine monthly and two quarterly periodicals. There are 34 churches, viz.: 6 Baptist (3 colored), 3 Christian (1 colored), 1 Cumberland Presbyterian, 3 Episcopal, 1 German Lutheran, 2 Jewish, 5 Methodist Episcopal (1 German), 7 Methodist Episcopal, South, 4 Presbyterian, and 2 Roman Catholic.—The first permanent settlement at Nashville was made in 1779-'80, and the town was incorporated in 1784, and received a city charter in 1806. The state legislature met here from 1812 to 1815 inclusive, when it was trans-

ferred to Murfreesboro; but since 1826 it has sat at Nashville, which was made the permanent capital of the state by a legislative act of 1843. In July, 1850, a convention of delegates from several of the southern states was held in Nashville, at which secession was openly urged. In February, 1862, the city was the headquarters of the confederate general A. S. Johnston, while he was awaiting the result of Grant's operations against Fort Donelson. When tidings came that the fort had been captured the legislature was in session; it was immediately adjourned by the governor to meet at Memphis. It was Sunday; the churches were deserted, and the streets were piled up with property for removal. Johnston hastily abandoned the city, which was given over to the mob, and a scene of general plunder ensued. The Union forces moved upon Nashville, which was entered without opposition by a detachment under Gen. Buell, Feb. 26, Grant arriving the next day. Andrew Johnson was appointed military governor of Tennessee, March 5, and reached Nashville on the 12th. The common council refused to take the oath of allegiance, and were removed; the mayor was placed under arrest, and the press put under military supervision. During the ensuing summer several unsuccessful attempts were made by the confederates to regain possession of the city. In November, 1864, Gen. Thomas being in command of the Union army of Tennessee, Gen. Hood, who had succeeded Gen. J. E. Johnston and lost Atlanta, commenced an invasion of that state. Gen. Schofield, with a large Union division, fell back. He was overtaken at Franklin, 18 m. S. of Nashville, and a severe action ensued, Nov. 30. The confederates assaulted the Union intrenchments and were repulsed, losing 4,500 men according to Hood's account, or about 6,000 according to Schofield's estimate. Schofield then joined Thomas at Nashville, which was strongly fortified. Hood followed, and early in December intrenched himself in front of the Union lines. On the 15th Thomas made an attack in force and drove the enemy from their works. During the night Hood took up another position, where he was attacked by Thomas in the afternoon of the 16th. The confederates were driven off in almost total rout; but night coming on, the pursuit was suspended. It was resumed on the next day, mainly by cavalry. Hood maintained a strong rear guard, and succeeded, after several sharp skirmishes, in reaching the Tennessee river, which he crossed on the 27th. No trustworthy reports have ever been made of the losses in these actions. Thomas puts his loss in killed, wounded, and missing during the entire campaign at about 10,000. He states that he took 13,189 prisoners; the confederates lost several thousands by desertion; and their entire loss was probably nearly 25,000, besides 72 guns and a large number of small arms. For all practical purposes their

army was entirely broken up, and Hood was removed from command Jan. 23, 1865.

NASMYTH, James, a British inventor, born in Edinburgh, Aug. 19, 1808. He studied in the school of arts and at the university of Edinburgh, and was employed in London previous to settling in Manchester in 1834, when he founded an extensive establishment for the manufacture of machinery, from which he retired in 1856. He invented the steam hammer, the steam pile driver, and a new and effective kind of ordnance, and constructed powerful telescopes for investigating the moon. In conjunction with James Carpenter, he published "The Moon considered as a Planet, a World, and a Satellite" (2d ed., 1874).

NASO, a town of Sicily, in the province and 40 m. W. S. W. of the city of Messina; pop. about 8,000. It is celebrated for its picturesque situation and its mediæval appearance. It contains fine buildings, and the trade is active. In the vicinity are ferruginous springs. Some authorities identify Naso with the ancient Agathyrnum or Agathyrna, but the site of the latter town is also assigned to another locality, and is altogether doubtful.

NASR-ED-DIN, shah of Persia, born in 1829. He succeeded to the throne on the death of his father, Muhammad, Sept. 10, 1848. The principal events of his reign are his successful contests with some of the neighboring tribes; his defeat in the war with England (1856-'7); a famine which broke out in 1871, and desolated a large portion of the country; and his visit in 1873 to European courts, the Russian and British cabinets both attempting to secure his good will. While in England he made concessions to Reuter for establishing railways and canals and working mines in Persia; but differences arose between the contracting parties, and nothing has yet been effected (1875). The shah wrote a curious diary of his European tour, which was translated verbatim into English by J. W. Redhouse (London, 1874).

NASSAU, formerly a German duchy, bounded by the Prussian provinces of the Rhine and Westphalia, by Hesse-Darmstadt, Hesse-Cassel, Hesse-Homburg, and Frankfurt; area, 1,808 sq. m.; pop. in 1866, 468,311. It now forms the S. W. part of the Prussian province of Hesse-Nassau, including the beautiful valley of the Lahn, between the Taunus range in the southeast and the Westerwald in the northwest; the towns of Wiesbaden (the former capital), Diez, Dillenburg, and Herborn; the watering places Ems, Selters, and Schwalbach; and the renowned vineyards of Johannisberg, Hochheim, Rüdesheim, and Asmannshausen.—In Germanic antiquity Nassau was inhabited by various tribes of Alemanni. After their incorporation with the Frankish empire various families rose into prominence, among which was that of Laurenburg or Lurenburg. Walram I. (died in 1020) was by his two sons, Walram II. and Otho, the founder of two lines, the older of which subsequently assumed the

title of counts of Nassau, after a small rural settlement of that name, which is mentioned in a public record as early as A. D. 794. The younger son became by marriage with the heiress of Gelderland the founder of the Guelldrian line, and from the latter are descended the Dutch princes of Orange, hence called of Nassau-Orange. Walram IV., of the elder line, was the father of Adolphus of Nassau, who was king of Germany from 1292 to 1298. The grandsons of the latter, Adolphus II. and John I., and their successors divided their inheritances into several branches, which were eventually reunited by Louis II., who died in 1625. His sons again divided the house of Nassau into several branches, of which that of Nassau-Weilburg was the more immediate source of the German line of dukes, who acquired their new dignity by joining the confederation of the Rhine (1806). After the fall of Napoleon, the German possessions of the Nassau-Orange line were acquired by the dukes of Nassau in exchange for territory ceded by them to Prussia. They also acquired at that time the hereditary right to the succession of Luxemburg, which however they sold to Holland in 1839 for about \$350,000. In the war of 1866, Nassau sided with Austria, was occupied by Prussian troops in July, and by the decree of Sept. 20, 1866, was annexed to Prussia. The last duke, Adolphus (born July 24, 1817), succeeded his father in 1839, and after his dispossession took up his residence in Frankfort, where he still resides (1875).

NASSAU, the N. E. county of Florida, bordering on the Atlantic, separated from Georgia on the N. and N. W. by St. Mary's river, and bounded S. by the Nassau river; area, 610 sq. m.; pop. in 1870, 4,247, of whom 1,970 were colored. It has a level surface and sandy soil. Amelia island, included in the county, occupies the whole of the coast. The county is traversed by the Florida railroad. The chief productions in 1870 were 24,058 bushels of Indian corn, 17,614 of sweet potatoes, 1,900 lbs. of rice, 984 of wool, and 4,198 gallons of molasses. There were 8,133 cattle, 777 sheep, and 3,447 swine. Capital, Fernandina.

NASSAU, an island in the Pacific ocean, in lat. 11° 30' S., lon. 165° 30' W., discovered by Capt. Sampson, of the American whaler whose name it bears, in 1835. It is low and apparently uninhabited, but wood and water are plentiful. It is supposed to be identical with Danger island, which an English whale ship so called reported in 1848 to be in lat. 11° 35' S., and lon. 166° 45' W.

NASSAU, a city, capital of the island of New Providence, of the Bahama group, in lat. 25° 5' N., lon. 71° 21' W.; pop. about 9,000. The town is well laid out, has a library and museum, and its salubrious climate makes it a winter resort for invalids. In 1872 the entrances were 43 steamers of 57,910 tons, and 196 sailing vessels of 20,104 tons; clearances, 43 steamers of 57,910 tons, and 186 sailing vessels of

18,950 tons; imports, \$911,582; exports, \$1,446,456, including cotton \$915,297, pineapples \$252,332, and sponge \$91,953. A falling off of \$558,567 from the imports of 1871 is due to a decrease in the number of wrecks. The increase in exports over 1871 was \$456,627. Wrecking, formerly extensively followed, is now much less profitable, and more attention is paid to agriculture. The French and Spaniards destroyed Nassau in 1703. It was rebuilt in 1718, fortified in 1740, and declared a free port in 1787. It was made a bishopric of the church of England in 1861. During the American civil war Nassau was a resort for blockade runners.

NASSAU (or Poggy) ISLANDS, two islands off the W. coast of Sumatra; pop. about 1,000. The northern island is situated between lat. $2^{\circ} 32'$ and $2^{\circ} 52'$ S., and the southern between $2^{\circ} 50'$ and $3^{\circ} 20'$ S.; they are separated by a narrow strait, and both are included between lon. $99^{\circ} 37'$ and $100^{\circ} 41'$ E. They consist of high steep hills, covered with timber of very large size, and well suited for masts and spars. Coconuts abound, and pepper is cultivated. The sago tree constitutes the chief article of food. The natives are divided into small tribes, each tribe living in one village.

NASSAU HALL. See PRINCETON.

NASSICK, or **Nashik**, a town of British India, in the province and about 100 m. N. E. of the city of Bombay, capital of a collectorate of the same name (pop. in 1872, 672,791), on the Godavary river and the Great India Peninsula railway; pop. about 25,000. It is celebrated for its Brahmanical temples and Buddhist excavations. Its proximity to the sources of the Godavary, and the legendary associations of the place, render it extremely sacred in the estimation of the Hindoos, who come as pilgrims to Nassick in large numbers. Their wealthy and numerous black basalt temples line both banks of the river. In the vicinity of the town, about 5 m. distant, are the Buddhist rock caves, which are believed to have been excavated in the 2d or 3d century of our era. There are more than 13 apartments, one of which is 45 ft. square, profusely ornamented with sculptures and colossal stone figures.

NAST, Thomas, an American artist, born in Landau, Bavaria, Sept. 27, 1840. He came to the United States in 1846, and at the age of 14 found employment as a draughtsman on "Frank Leslie's Illustrated Paper." In 1860 he went to England to illustrate the Heenan and Sayers prize fight, his sketches appearing in the "New York Illustrated News." Immediately afterward he went to Italy to follow Garibaldi, entered Naples with him, was present at the sieges of Capua and Gaëta, and executed sketches of the war for the "New York Illustrated News," the "Illustrated London News," and *Le Monde Illustré* of Paris. Returning to New York, he began in July, 1862, a series of war and political sketches in "Harper's Weekly," and since then has been one of the principal artists on that journal. In

1866 he executed for the *Bal d'Opéra* in New York 60 caricatures of prominent politicians, editors, artists, and actors. Some of these pictures measured 3 ft. by 4, others 4 ft. by 6, and all of them were painted in water colors in 30 days. In 1873 he appeared as a public lecturer in leading cities throughout the United States, illustrating his lectures by caricatures drawn on the stage. Among some of his best known sketches in "Harper's Weekly" are "Santa Claus in Camp" and "Christmas Eve" (1863); "New Year's Day North and South" (1864); "President Lincoln entering Richmond" (1865); and an extended series of political pictures. He illustrated "The Tribute Book" and Nasby's "Swinging round the Circle;" contributes a cartoon and other illustrations every month to the "Phunny Phellow;" and has issued annually since 1872 "Nast's Illustrated Almanac."

NASTURTIIUM, the generic name of a plant of the *crucifera* or mustard family, and the common name of the widely different genus *tropæolum*. The genus *nasturtium* (Lat. *nasus tortus*, a tortured nose, some of the plants being exceedingly pungent) includes among other plants the well known water cress and horse radish, both of which are described under their proper titles. The old herbalists, who classified plants by their sensible properties rather than by their structure, finding the species of *tropæolum* to possess a pungency similar to that of the cruciferous plants, included them under *nasturtium*, a name which in this or its altered form of sturition they have retained, in spite of the fact that the books give Indian cress as their suitable common name. In the most recent revision of genera *tropæolum* (Gr. *τροπαιον*, a trophy, the leaves of some resembling a shield, and the flowers a helmet) is placed in the *geraniaceæ*; it includes tender South American herbs, most of which climb by means of their long leaf stalks, and have a pungent watery juice with the taste and odor of cress. There are about 35 species, most of which are in cultivation, besides numerous garden varieties. Some are treated as garden annuals, others as greenhouse plants; a number of the species produce tubers. The flowers consist of five sepals, united at the base and extended at the upper side of the flower into a long spur; petals five or fewer, usually with claws, the upper two somewhat different from the others and inserted at the mouth of the spur; stamens eight, unequal; ovary three-lobed with a single style, and in fruit forming three fleshy separate carpels. The common garden *nasturtium* (*T. majus*) is one of the most generally cultivated annuals; the stem climbs 6 or 8 ft., and is often planted near fences, or provided with brush, which it soon covers with its peltate foliage; the flowers vary from yellow to orange, scarlet, and crimson; the three lower petals have longer claws than the others, and are fringed at the base. There is a double variety, and dwarf forms which do

not climb. The unexpanded flower buds, and the young fruit while still tender, are pickled in vinegar; and the French, who call the plant *capucine*, use the gay-colored flowers to ornament salads. The dwarf varieties of this form bushy rounded tufts about a foot high,



Dwarf Nasturtium (*Tropæolum minus*).

and are used for bedding; some of the named varieties have flowers of exceedingly rich colors. The smaller nasturtium (*T. minus*) has smaller flowers, with petals pointed at the tip, and smaller seeds; but it is so mixed up with the dwarf forms of the preceding that the true species is rarely met with. The canary-bird flower (*T. peregrinum*) is one of the most interesting of garden climbers, and very unlike the others; it climbs high and spreads rapidly; its leaves are five- to seven-lobed, and its small flowers have the two upper petals cut-lobed,



Canary-Bird Flower (*Tropæolum peregrinum*).

the lower ones fringed, and the spur curiously curved; when partly expanded the flowers may be fancied to resemble a little bird, an appearance which is aided by the lively canary-yellow color of the petals. It is an easily cultivated annual, which like the others is more produc-

tive of flowers in rather poor than in rich soils. The tuberous nasturtium (*T. tuberosum*) has red and yellow tubers the size of a small pear, five-lobed leaves, short orange-colored petals, and an orange-red calyx with a heavy spur. This is the *ysano* of the Peruvians, with whom it is held in high esteem as an article of food; and it has been introduced into Europe and this country as a garden vegetable, but has met with little favor. In South America the tuber is first boiled and afterward frozen, and is eaten in the frozen state. The tubers are preserved and propagated in the same manner as potatoes. Lobb's nasturtium (*T. Lobbianum*) is a favorite greenhouse climber, but it does not flourish so well in the open air as the common species, which it much resembles; it has smaller and slightly hairy leaves, and much fringed flowers, which in the many named varieties present a great diversity of color. Among the tuberous-rooted greenhouse species are *T. tricolorum*, with scarlet and black flowers; *T. azureum*, blue and white; and *T. Jarattii*, carmine and yellow. They are summer-flowering, and remarkable for the exceeding delicacy of their stems, which near the tuber are scarcely larger than a thread; they are trained upon low trellises, while *T. pentaphyllum*, also tuberous, can be trained to pillars and rafters. All the *tropæolums* are raised from seed, which in some is very slow in germinating, and those with fleshy stems grow readily from cuttings.

NATAL, a British colony in S. E. Africa, N. E. of Cape Colony, from which it is separated by Caffraria along the coast. It lies between lat. 27° 30' and 31° 30' S., and lon. 28° 30' and 32° E., and is bounded N. E. by the Buffalo and Great Tugela rivers, beyond which is the Zooloo country, S. E. by the Indian ocean, S. and S. W. by Caffraria, and W. and N. W. by the Drakenberg range, with the Orange River Free State on the opposite slope; length about 250 m., breadth between the sea and the mountains 150 m.; coast line 170 m. long; area, according to the British parliamentary accounts of 1872, 16,145 sq. m.; pop. 250,852. In 1869 the number of whites was 17,821, and of Indian coolies introduced as agricultural laborers 5,227, but the native Zooloos make up the bulk of the population. Many of the 16 districts into which the colony is divided have been but partially explored. Pietermaritzburg, the capital, in lat. 29° 35' S., lon. 30° 20' E. (pop. in 1869, 6,192), and D'Urban, the colonial port, about 50 m. distant (pop. 5,708), are the principal towns; while villages of various sizes are scattered over the colony. D'Urban is situated upon the coast, on the N. side of Port Natal, a circular basin about 10 m. in circumference, communicating with the sea by a narrow channel. This is the only harbor of any importance, and efforts have recently been made to improve it. The country rises from the coast in a series of terraces to an elevation of between 3,000 and 4,000 ft.,

at the base of the Drakenberg, and presents many varieties of climate, soil, and scenery. Along the Indian ocean is a belt of undulating or hilly land about 25 m. broad, producing sugar, coffee, cotton, tobacco, and many other tropical plants, together with the mulberry, olive, vine, oats, beans, potatoes, and Indian corn, and diversified with occasional tracts of forest. Succeeding this belt is a higher tract displaying the productions of a temperate climate; still further inland is a fine grazing district, and back of this a succession of hills extending to the foot of the Drakenberg division of the Quatlamba mountains, which rises abruptly like a wall to a height of 8,000 ft. above the sea, and nearly 4,000 ft. above the country at its base, and over which there are but two practicable passes. Several offshoots of this range approach the coast. The climate is exceedingly pleasant and healthful. In the neighborhood of the coast the weather is warm, the average temperature being about 74° in summer and 63° in winter; but in the elevated districts it is much cooler. The rainy season continues from March to the end of September, during which violent thunder storms are frequent. The grazing country produces abundant crops of wheat, oats, and other cereals of the temperate regions, and excellent apples, pears, walnuts, peaches, apricots, and nectarines. From the coast upward the whole is well watered by numerous streams and several considerable rivers, none of which are navigable. All the rivers are low in the dry season, but become full in a few hours in rainy weather, and rush down like torrents. Along the coast the soil is sandy, with masses of volcanic rocks and sandstone interspersed. The high lands are composed of stratified sandstone, with a vein of granite running in a N. E. direction; and the soil is mostly a friable loam. The coast line, extending from high-water mark 5 or 10 m. inland, has proved to be well adapted to the cultivation of cotton, which has been raised in the colony since 1866, and now forms an important article of export. But little definite scientific knowledge yet exists as to the mineral resources of Natal. Coal deposits of good quality are said to exist in the Tugela valley; iron ore occurs in many places; copper has been discovered; beds of limestone are known to exist; and small quantities of gold have been obtained in the vicinity of D'Urban. The number of the larger wild animals in the colony is diminishing. The elephant is met with in the remote forest districts, and the hippopotamus frequents some of the eastern rivers. The fauna also includes the leopard, hyæna, buffalo, eland, several other varieties of antelope, the crocodile, and a number of snakes, some of which are venomous.—The native Zooloo population, belonging to the same ethnological family as the Caffres, are a pastoral people and disinclined to agricultural pursuits, in which however, under European influence, they have extensively en-

gaged. They are remarkable for their honesty and peaceable disposition. In 1871 the total number of acres under crops and grass was 175,355, of which 106,800 were devoted to the growth of maize. Of sugar, which is one of the principal products, 7,661 tons, valued at £159,430, were exported in the crop season of 1870-'71, as against 857 tons, valued at £21,286, in that of 1860-'61. In 1870 there were 1,014,210 lbs. of coffee raised, while the product for 1869 amounted only to 4,058 lbs. Sheep are raised in large numbers, and the value of the wool exported exceeds that of any other article, amounting to £140,597 for 4,814,710 lbs. in the first nine months of 1871. The total value of the exports in 1870 was £382,979, comprising the following principal articles in the order of value: wool, raw sugar, hides, ivory, butter, ostrich feathers, arrowroot, cured meat, raw cotton, and grain. The imports for the same year were valued at £429,527, and included cotton, woollen, and leather manufactures, ironmongery, flour and meal, coffee, rice, and linen. Since the discovery of diamonds near the Vaal river, large numbers of these gems have been exported through Natal; but it has proved difficult to ascertain the aggregate value, as many of them are carried away without any declaration to the authorities. In 1870 the value of the diamonds exported through the D'Urban custom house was £9,615; in the first 10 months of 1871 it was £32,056. Exclusive of coasters, the tonnage of vessels entered at the ports of Natal in 1870 was 23,881, and of those cleared 24,005.—In 1870 there were 79 schools sustained wholly or partially by the government, with an average attendance of 1,797 pupils. Of these, 4 were classed as government schools, including high schools at Pietermaritzburg and D'Urban, 65 as aided schools, and 10 as itinerant schools. The school system is under the control of a superintendent of education. Excellent schools are also maintained by missionaries in various parts of the country, prominent among which are the American mission schools in the coast range, and those of the church of England and of the Wesleyan church. At Pietermaritzburg there is a central training school belonging to the Free church of Scotland. The colony was made a diocese of the Anglican church in 1853, and is also the seat of a Roman Catholic bishop. The American mission is composed chiefly of Presbyterian and Congregational ministers; in 1870 it maintained 19 stations and out stations, with 12 churches, having about 500 native members.—In the government of Natal, the crown retains the right to veto colonial legislation, and the public officers remain under the control of the home government. The executive authority is vested in a lieutenant governor, who is assisted by an executive council of 8 and a legislative council of 16 members. The colonial secretary, the treasurer, the attorney general, and the secretary for native

affairs belong *ex officio* to both. The 12 additional members of the legislative council are representatives from the counties and boroughs, elected by voters possessing freehold property worth £50, or occupying house or land at a rent of £10 a year; all voters are eligible to membership. Two of these representatives, designated by the lieutenant governor, together with the chief justice and the senior officer in command of the troops, constitute the four additional members of the executive council. The judicial system comprises a supreme court with three justices, sitting at Pietermaritzburg, and local courts and magistrates in the several counties. In 1871 the revenue, derived from customs, land sales, stamps, a native hut tax, and other sources, amounted to £180,498, and the expenditure to £132,978. There is a public debt of £263,000. The military expenses, with the exception of about £4,000 per annum, are borne by Great Britain; they were £39,188 in 1869, of which the colony provided £4,272, besides expending £1,061 for its volunteer forces. There is telegraphic communication between D'Urban and the capital, and a project for the construction of 345 m. of railway has been approved by the government.—The Portuguese discovered the coast of Natal on Christmas day, 1497, and named it in honor of the day. It was visited and favorably reported upon, toward the close of the 17th century and later, by Dampier, Woodes Rogers, and several Dutch navigators. Subsequently a Dutch expedition purchased the territory from some native chiefs. Its actual colonization, however, was not projected till 1823. In that year Mr. Thomson, a merchant of Cape Town, and Lieuts. Farewell and King of the English navy, in the course of a trading voyage to the E. coast of Africa, put into Natal harbor. In 1824 Lieut. Farewell, having visited it again, obtained from the chief of the Zooloos, who had conquered the country, a grant of land around Port Natal, where he hoisted the British flag and took possession. In 1834, in consequence of an application to the governor of the Cape of Good Hope from the Zooloo chief for a white settlement to be formed at Natal, a few emigrants proceeded from that colony. In 1835 the American missionaries commenced operations in the territory; but nothing was done on a large scale till about 1837, when the Dutch farmers who were dissatisfied with the British rule in the Cape Colony ascended to the sources of the Orange river, and found their way across the Quatlamba mountains under the leadership of Pieter Retief, who became engaged in a contest with the chief of the Zooloos and was slain, together with many of his followers. The remainder, led by Andries Willem Pretorius, defeated the Zooloo chief in the following year, and founded Pietermaritzburg with a view to make it the capital of their settlement, which they called the republic of Natal, delegating the necessary powers of govern-

ment to a council of 24 with a president at their head. The men capable of bearing arms were enrolled as militia-subject to the council. When the English government, in 1845, declared the British sovereignty to extend over Natal, and sent a military expedition to take possession of the country, after some resistance the more resolute of the emigrants, under Pretorius, abandoned the territory. Natal remained subordinate to the government of Cape Colony till 1856, when it was constituted a separate and distinct colony. In 1873 a conflict with the Ama-Hlubi tribe, numbering about 10,000, charged with the illegal possession of unregistered firearms, resulted in the killing of about 200 of them, the transportation of as many more, including their chief Langalibalele, and the outlawry of the whole tribe.

NATCHEZ, a tribe of North American Indians, known to Europeans from 1560, when Tristan de Luna aided the gulf tribes against them. With the Tensas, a kindred tribe, they held a tract on the E. bank of the Mississippi. According to their traditions, they came from the southwest, in consequence of wars with ancient inhabitants, and made a stand on the seacoast, where a part remained, while others pushed on to the spot where they were found. Their language, sabæism, and mound building connect them with the Mayas of Yucatan. La Salle reached their country in March, 1683, and planted a cross. Iberville also visited them, and proposed to build a city there. They were mild and friendly, brave, though preferring peace to war, and very dissolute. They were governed by the Great Sun, descended in the female line from a man and woman, their first civilizers, who came down from the sun, and first built the temple for perpetual fire, which was always afterward maintained. This temple was on a mound 8 ft. high, with a pitched roof, and contained the bones of the suns and three logs slowly burning under the care of appointed guardians. The cabin of the sun was on a similar mound, but with rounded roof. His power was despotic, as was that of his sister and immediate kindred. He was never approached without special marks of reverence. Next to the suns were the nobles, while the Michemichiquip, called Puants by the French, formed the common people, and were evidently of the Choctaw race. They used bows and arrows, but had no metals, dressed in buffalo robes, and made feather robes for winter, and others for summer of the bark of the mulberry and of flax. They had many feasts, and on the death of a chief killed many to attend him. The dead were kept on raised platforms till the flesh was consumed. They rapidly declined after the appearance of the French and of English traders, who about the same time reached them. La Mothe Cadillac in 1715 refused the calumet, and they killed some Frenchmen; but Bienville in 1716 compelled them to give up the murderers, and built a fort there.

Hostilities were renewed in 1722, but Bien-ville burnt the Apple village and again compelled them to punish the guilty. In 1729 the tyranny of Chopart, who wished the site of one of the villages for his own use, led to a conspiracy in which apparently the Choctaws and Chickasaws were engaged. On Nov. 28 the Natchez began a general massacre of the French, killing all the men except 20 who escaped and two or three kept for service; a few women were killed, but most were kept as prisoners, and the negro slaves were adopted. Their kindred Tensas had disappeared before 1712 as a distinct tribe, and do not appear in these troubles; but the Yazooos and Chickasaws joined the Natchez, while the Choctaws joined the French and were first in the field. Lesueur, a Canadian officer, raised a large Choctaw force, and marching into the Natchez territory attacked the enemy Jan. 27, 1730, killed 80, and recovered many captives and slaves. The chevalier de Loubois soon after came up with the colonial troops that had been raised at New Orleans, moved slowly up the Mississippi to the Tonicas, and after some delay finally on Feb. 13 besieged the Natchez forts. He showed little vigor, and after obtaining the remaining captives allowed the Natchez at the end of February to escape. The fugitives in their flight cut off French parties, and at last made a stand on Black river, west of the Mississippi. Gov. Perrier on Jan. 25, 1731, reduced this fort and captured the sun, his brother and nephew, next in succession, 40 warriors, and

387 women and children. These were sent to Santo Domingo and sold as slaves. The remnant of the nation, more furious than ever, fled to the Chickasaws, after killing many of the Tonicas and attacking the Natchitoches, where they were repulsed with heavy loss by Saint-Denis. But in spite of this repulse they with the Chickasaws kept up the war, and the French attempting to punish the Chickasaws were repulsed, and at last patched up a peace in 1740. The Natchez never again appeared as a distinct nation. After a time they moved to the Muskogees, and in 1835 were reduced to 300 souls, retaining their own language and line of suns, but without restoring their temple or worship.—For their language the only materials are the words preserved by Le Page du Pratz and other French writers, and a vocabulary taken by Gallatin in 1826 from the chief Isahlakteh. Dr. Brinton traced the analogy between it and the Maya.

NATCHEZ, a city, port of entry, and the capital of Adams co., Mississippi, the second city in the state in population, situated on the E. bank of the Mississippi river, 279 m. above New Orleans and 116 m. below Vicksburg by water, and 85 m. in a direct line S. W. of Jackson; lat. 31° 34' N., lon. 91° 25' W.; pop. in 1850, 4,434; in 1860, 6,612; in 1870, 9,057, of whom 5,329 were colored. It is built on the summit of a bluff 150 ft. above the water, and on the narrow strip of land between the foot of the hill and the river. The latter portion of the city, called Natchez Landing or Natchez-



Natchez-on-the-Hill.

under-the-Hill, has some important business houses, but can make no claim to beauty. It communicates by broad and well graded roads with the upper quarters (Natchez-on-the-Hill), which are beautifully shaded and contain many handsome residences and other buildings. The streets are regular, lighted with gas, and generally gravelled in the roadway. The houses are principally of brick, and the residences are

adorned with gardens. The brow of the bluff along the whole front of the city is occupied by a park. The principal buildings are the court house, in a public square shaded with trees, the masonic temple, the Catholic cathedral, with a spire 182 ft. high, the Episcopal church, and the Presbyterian church, with a spire containing a clock. The city hall and market house are immediately back of the

court house. In the suburbs there were formerly numerous residences of wealthy planters, expensively furnished, and surrounded with beautiful lawns and gardens; but many of these were destroyed in the civil war. On the bluff, adjoining the city, there is a national cemetery, handsomely laid out and decorated. The climate of Natchez is pleasant and very salubrious. The winters are temperate, though variable, and the summers are long and equable; the thermometer seldom rises above 90°. The business is mainly in cotton, which is brought to this market from the adjoining counties, and in the supply of provisions and implements for the neighboring plantations. From 13,000 to 20,000 bales of cotton are annually shipped to New Orleans. Regular lines of steamers connect with New Orleans, Vicksburg, and Memphis, and a stage line runs to Brookhaven on the New Orleans, Jackson, and Great Northern railroad, 60 m. E. There are a Protestant and two Roman Catholic orphan asylums, and a city hospital. The United States marine hospital is situated between the city and the national cemetery. There are several Roman Catholic schools, and good public schools, attended by about 1,000 pupils. Of the two school buildings, one is a handsome structure recently erected for colored children, while the "Natchez institute" for whites was used as a free school before the civil war. A daily and two weekly newspapers are published. The city contains eight churches, viz.: Baptist (2), Episcopal, Jewish, Methodist (2), Presbyterian, and Roman Catholic, besides several for colored people.—The site of Natchez was selected by a party sent by Le Moyne d'Iberville in 1700 as the chief place of a number of proposed settlements in the lower Mississippi territory, and the name of Rosalie was given to it in honor of the countess of Pontchartrain, whose husband had been one of Iberville's patrons. No settlement was made however until 1716, when Bienville, Iberville's brother, built Fort Rosalie on Natchez bluff. In November, 1729, the fort and adjacent settlements were destroyed by the Natchez Indians and the inhabitants massacred; but a few months later a force of French and Indian allies drove out the Natchez and rebuilt the fort, which continued to be a French military and trading post until it passed into the hands of Great Britain by the treaty of 1763. It was now called Fort Panmure. In 1779 it was occupied by the Spaniards, who kept possession of it until March, 1798, although by the treaty of 1783 it was rightfully included in the territory of the United States. In April, 1798, the territory of Mississippi was created by act of congress, and Natchez became its capital. It was incorporated as a city in 1803. In 1820 the seat of government was removed to Jackson. In 1840 a large part of the city was laid in ruins by a tornado. During the civil war Natchez was captured, May 12, 1862, by a portion of Farragut's fleet. It had never been

occupied by any considerable force of the confederates, and being of little military importance was soon abandoned by the Unionists.

NATCHITOCHES, a tribe of American Indians, allied to the Caddoes, and formerly residing on Red river, Louisiana, with a fortified town on an island. The Washitas and Capichis were united with them. They worshipped the sun, had a temple with perpetual fire, and made salt at a neighboring lake, which they traded to other tribes for grain and skins. They were always friendly to the French, who planted a fort near them. This led to an attack on them by the fugitive Natchez in 1731. They gradually united with the Caddoes, forming a band of that tribe.

NATCHITOCHES, a N. W. parish of Louisiana, intersected by Red river and bounded E. by a branch, Saline bayou; area, 2,260 sq. m.; pop. in 1870, 18,265, of whom 10,929 were colored. It has a level surface and fertile soil, especially near the rivers. The chief productions in 1870 were 231,746 bushels of Indian corn, 12,356 of sweet potatoes, 15,671 bales of cotton, and 3,189 lbs. of wool. There were 2,949 horses, 1,845 mules and asses, 3,527 milch cows, 1,644 working oxen, 8,952 other cattle, 5,442 sheep, and 10,244 swine. Capital, Natchitoches (pop. in 1870, 1,401), a shipping point on Red river, about 500 m. by water N. W. of New Orleans.

NATICK, a town of Middlesex co., Massachusetts, on the Boston and Albany railroad, at the junction of the Saxonville branch, 17 m. W. by S. of Boston; pop. in 1870, 6,404. Charles river flows through the S. E. portion, and Cochituate lake, which supplies Boston with water, is partly within the town. Farming is carried on to some extent, but the principal business is the manufacture of boots and shoes, for which there are 15 or 20 establishments. There are also a hat factory and a base-ball manufactory. The town has a national bank, a savings bank, water and gas works, a fine public library and library building, a high school, a weekly newspaper, and eight churches. Natick was incorporated in 1781. The first Indian church in New England was erected here in 1660, on the site now occupied by the Unitarian church. John Eliot preached here, and in the cemetery is a monument to his memory.

NATIONS, Law of. See LAW OF NATIONS.

NATRON. See SODA.

NATURAL BRIDGE. See BRIDGE, NATURAL.

NATURAL HISTORY, strictly speaking, the history of universal nature or of all natural objects, their qualities and forces, their laws of existence, their origin (as far as possible), and their mutual relations to each other and to man. The study of the physical forces of nature, however, has been separated into distinct branches of science, under the names of natural philosophy, chemistry, astronomy, &c.; leaving for natural history proper the investigation of the structure, properties, and uses of the inanimate bodies called minerals, and of

the various kinds of living things, both animal and vegetable, including their description, collection, preservation, determination, and arrangement in a natural series, and embracing as principal divisions zoölogy, botany, and mineralogy. For details on these divisions, see the articles ANIMAL, BOTANY, COMPARATIVE ANATOMY, GEOLOGY, MINERALOGY, PHYSIOLOGY, ZOÖLOGY, and the various animal and vegetable classes in their respective order.

NATURALIZATION, the act of investing an alien with the rights and privileges of a native-born citizen or subject. It is of two kinds, collective and personal. A collective naturalization takes place when a country or state is incorporated in another country by gift, cession, or conquest. Thus, when England and Scotland were formed into one kingdom in the reign of Queen Anne, it was declared by the fourth section of the act of union that subjects of the United Kingdom possessed thereafter all the rights, privileges, and advantages enjoyed by the subjects of either kingdom; and when Louisiana was ceded by France to the United States in 1803, it was provided by the third article of the treaty that its inhabitants should be entitled to all the rights and privileges of citizens of the United States; and a similar effect took place when the republic of Texas was annexed to and formed into one of the states of the American Union. Personal naturalization is where the privileges of a subject or citizen are conferred upon an individual by the license or letters patent of a sovereign or the act of a legislative body, or are obtained by the individual himself under a general law, upon his complying with certain conditions prescribed by the law.—Naturalization was practised among the states of antiquity, and is found in the rudest forms of human society. The North American Indians frequently adopted Europeans, and more frequently members of other tribes taken in war. The earliest account that we have of naturalization is among the Jews. It formed a part of their early legislation, as embodied in the books of Moses. The knowledge we possess of the laws or customs of the great contemporary nations, the Egyptians, Assyrians, Babylonians, Phœnicians, and Persians, is too limited to enable us to know with certainty the policy they pursued upon this subject.—In Greece, during the heroic ages, the people had few or no privileges, and whatever was allowed to them appears to have been as freely extended to strangers. In the convulsions which followed these ages, naturalization was readily granted; but as the different states settled down into compact and well organized communities, the value of citizenship became enhanced, and the privilege was more sparingly bestowed. In Athens, so far as can be gathered from the fragmentary information that has descended to us, there would seem to have been three kinds of naturalization: 1, the admission of an alien to membership in a deme or township by the vote of its inhabitants, at

their convocation or general meeting, and the inscribing of his name upon the lexiarchic register, or roll of the qualified citizens of the deme, kept by the demarch; 2, citizenship conferred by the state as a mark of distinction upon foreigners eminent for their virtues or talents, or who had rendered important services to the republic; 3, privileges, more or less qualified, extended to the inhabitants of other states, or to particular persons. By the laws of Solon, none but those who were banished from their country for ever, and had with their families taken up their permanent abode in Attica, with the intention of practising some trade or profession, could be enrolled in the list of citizens. Afterward, however, the practice arose of bestowing citizenship as the gift of the state. It was conferred as an honorary distinction upon foreigners, admitting them to every privilege except that of holding the office of archon or priest, and did not imply the necessity of residence; but whether it entitled them to vote in the assembly is a point upon which authors are divided. The admission of aliens as members of a deme, which was the ordinary or general mode of naturalization, was very limited at first, as the Athenians, in common with the other Grecian states, placed a high value upon citizenship, and were suspicious of and prejudiced against foreigners. When Clisthenes made a new division of the tribes, in 509 B. C., and of their subdivision into demes or local parishes, townships, or cantons; he, with a view of strengthening these separate political communities, added new citizens, among whom were included not only resident foreigners and strangers, but even slaves. It was not intended as a precedent, but was a temporary expedient to enable him to carry out more effectually his plan for the division of the people into local communities. The innovation, however, was followed by the gradual extension of a more liberal feeling in regard to aliens. There was constantly at Athens a large body of resident foreigners, attracted there either by commercial pursuits, or a wish to profit by the instruction of its schools, or the love of amusement. This class, embracing persons from all parts of Greece and from other countries, were known, in contradistinction to transitory strangers or mere sojourners, by the appellation of *metœci*, and were under many disabilities. They could not acquire landed property, and if engaged in industrial pursuits, they were subject to a heavier tax than the citizens. They were compelled to select a patron as the mediator between themselves and the state in the transaction of all legal business, who was answerable for their good conduct. They were obliged, like the citizens, to serve in the army or navy when the exigencies of the state demanded it, and occasionally compelled to perform degrading services, which were rather symbolical acts, designed to remind them of the inferiority of their relation to the citizen. Upon the payment of the tax imposed,

they were allowed to engage in trade and commerce; and nearly all commercial business was in their hands. To this class, who had made Athens their permanent abode, it was of the greatest importance to be admitted members of a deme, as it released them from a burdensome tax, enabled them to acquire land, to inherit, and generally to enjoy the privileges of citizens, except that of holding the office of archon or priest. So strong was this desire, that they were occasionally induced to get their name surreptitiously entered upon the register of a distant deme; for a citizen was not obliged to reside in the one in which he was enrolled, and there were at least one hundred of these distinct commonalties distributed over Attica; but if the fraud was discovered, the alien was liable upon conviction to be sold as a slave. Themistocles exerted himself strongly in favor of this class, and chiefly through his influence their admission into the demes was greatly facilitated, and it afterward became more general. When the number of the citizens was greatly diminished by war, the loss was supplied by the admission of the resident aliens or *metœci*. After the disastrous defeat at Syracuse, which nearly depopulated the state, the ranks of the citizens were recruited by naturalizing the *metœci*. The lexiarchic registers were filled with these names, and the naturalization was so extensive as nearly to abolish all distinction. The loss of citizens was again supplied in this way after the battle of Chæronæa; and perhaps no state, in proportion to its population, ever naturalized so many aliens. It was the fixed policy of the Spartans, and the peculiar aim of their institutions, to retain to themselves and to their descendants the exclusive exercise of political power; and so rigidly was this policy pursued, that Herodotus declares that but two instances had occurred in which they had admitted foreigners to the full franchise. After the time of Herodotus, foreigners were occasionally admitted, and it is after this period that helots are supposed to have been raised to this dignity. Upon the revolution effected by Cleomenes, and the reconstruction by him of the constitution of the state, he admitted a considerable number of new citizens. They were selected from among the most worthy and deserving of the population, and embraced natives of Laedæmon, *Periœci*, and strangers, all of whom were admitted to the full franchise. (See SPARTA.)—In Rome citizenship, or the Roman burgess right, was originally limited to the patricians. It was at first sparingly bestowed on distinguished foreign clans, after their emigration from their homes or after the conquest of their cities; but such grants became more rare as the privilege increased in value. During the republic citizenship was conferred by a vote of the senate upon aliens who had rendered eminent services to the state, of which several striking examples are mentioned by the Roman historians. After the social or Marsic war, 90 B. C.,

the right was extended to all the people of Italy. Under the emperors, down to the reign of Caracalla, foreigners petitioning for citizenship were naturalized by an imperial decree; but under a constitution promulgated by Caracalla, all the free inhabitants of the various provinces comprising the empire became thereafter Roman citizens; and as that empire embraced the civilized world, there could be few or no instances thereafter of personal naturalization.—The mode of obtaining naturalization in modern times, and the conditions upon which it will be granted, differ in different countries. In the United States the power of conferring it is exclusively vested in the national government. This power has been sometimes exercised by a collective naturalization, in cases where foreign territory has been acquired, and in respect to certain Indian tribes, as well as by the fourteenth amendment of the constitution, which made citizens of the freedmen and other colored persons; but the mode in which individuals obtain it on their own application is regulated by acts of congress. The policy of this country on the subject, which is characterized by a desire to admit all foreigners of good character to a full participation in all the rights enjoyed by our own citizens, after a period of probation sufficiently long to enable them to become acquainted with the nature of our institutions, is to be traced back to an early period of our colonial history. It was not derived, like many of our laws, from the enactments or the example of Great Britain, but grew out of the necessities attendant upon the settlement of a new country. At the period when the colonies were founded, the policy of England for more than a century had been hostile to conferring political privileges upon foreigners; and so illiberal was its course in this respect through the whole period of our colonial history, that one of the acts of tyranny charged upon George III. in the Declaration of Independence was, that he had endeavored to prevent the population of the states by obstructing the laws for the naturalization of foreigners, and by refusing to pass others to encourage their migration hither. The only mode by which a foreigner in England could obtain naturalization, investing him with all the rights of a subject, was by act of parliament. He could obtain letters of denization by the king's special license, which was granted with certain restrictions. In the seventh year of the reign of Queen Anne an act was passed naturalizing foreign Protestants, by which persons of this class could be admitted to all the rights of subjects upon receiving the sacrament and taking the oaths of abjuration and allegiance; but it was repealed in the short space of three years. The rights of foreigners settled in the colonies were in a very precarious state. By the law of England they could neither hold nor transmit real property, nor exercise any political rights; and by the navigation act, unless they were naturalized or made

free denizens by the king's letters patent, they were forbidden to exercise in any of the colonies the occupation of a merchant or a factor. To remedy this state of things and to encourage immigration, the colonial legislatures exercised the right of passing naturalization laws. Maryland was the first colony that took this course. In 1666 she enacted a law for the naturalization of the Dutch from Cape Henlopen and the French Protestant refugees who had settled in the colony, and continued to pass laws for the naturalization of aliens to the time of the revolution. In 1671, in the reign of Charles II., the colony of Virginia passed an act for the naturalization of any one desiring to make that commonwealth his constant residence, who might apply by petition to the general assembly. Five acts were afterward passed, naturalizing a number of aliens who had petitioned for the privilege; and in 1680 the governor was authorized to grant letters of naturalization to any foreigner settled in the colony upon his taking the oath of allegiance. In 1705 a law was passed adding the test oath to the oath of allegiance to secure the Protestant succession, and in 1738 another act naturalizing any alien who might settle upon the Roanoke. In South Carolina, in 1693, the French Protestants who had settled in the province were made citizens by the colonial legislature; and in 1731 Massachusetts passed an act for the admission of foreign Protestants after a residence of one year. The colony of New York passed an act in 1683, declaring that all actual inhabitants of the province professing Christianity, of whatever foreign nation, should be entitled to all the privileges of natural-born subjects upon taking the oath of allegiance. Delaware in 1700 passed an act empowering the governor to declare any alien, previously settled, or thereafter coming to settle in the province, naturalized, upon taking an oath to be true and faithful to the king and to the government of the province, and declaring that all Swedes, Dutch, and other foreigners settled in the colony before its acquisition by the English were to be deemed fully and completely naturalized. Pennsylvania also passed a naturalization law in the same year, and South Carolina a general act in 1696. These laws were not favorably regarded in England. They were looked upon as encroachments upon the royal prerogative or the rights of parliament; and even in the colonies, the more strenuous loyalists denounced them as disregarding the navigation acts, and as tending to an undue increase of the inhabitants, thereby creating formidable antagonists to English industry, and nursing a disposition to rebellion. In 1715 the colony of New York passed an act for the naturalization of all foreign Protestants then inhabiting the province. The act was referred by the board of trade to Northey, the English attorney general, who condemned this mode of naturalizing "in the lump," but recognized the right of the colonial legislature to naturalize particular aliens by

name, after inquiring into each case specially; and thereafter down to 1773 some 14 acts were passed, by which an immense number of aliens were naturalized by name. In 1740 an act was passed by the British parliament for the naturalization of foreign Protestants settled in the colonies of America. It required a residence there of seven years, without having been absent at any time for more than two months; all naturalized under it, except Quakers or Jews, had first to receive the sacrament of the Lord's supper in some Protestant communion; and by an act passed in 1747, the benefit of the previous act was extended to the Moravian Brethren, and other foreign Protestants settled in America, who had conscientious scruples against taking an oath. This was undoubtedly designed to supersede colonial legislation, but it did not have that effect. The long period of residence required was very objectionable in a new country, and the Catholics, who had settled extensively in Maryland, were excluded from its provisions. The colonial legislatures still continued to pass naturalization laws, and the difficulties growing out of the subject continued to increase until the separation of the two countries.—During the revolution, and until the adoption of the federal constitution, the power of naturalizing aliens was exercised by the states. The constitution of the state of New York, adopted in 1777, declared that it should be in the discretion of the legislature to naturalize all such persons, and in such manner, as they should think proper. The legislature enacted no general law, but continued to pass acts for the naturalization of persons by name down to the year 1790. After the breaking out of the revolution, and especially after the independence of the United States was recognized by Great Britain, it became necessary both here and in England to determine who of those born in the colonies were to be deemed aliens. It was decided in the English courts that all persons of this class, adhering to the American government during the war and until after the treaty of 1783, ceased thereafter to be subjects of Great Britain, and were aliens; but in the American tribunals it was held that the colonies acquired all the rights and powers of sovereign states when they declared their independence on July 4, 1776, and that the people of the respective states ceased upon that day to be subjects of Great Britain, and became members of the new nation then formed; that none were excepted unless, within a reasonable time after that event, they had placed themselves under the protection and power of the government of Great Britain in such a way as to indicate an election on their part to remain in allegiance to that country. It was conceded by the tribunals of both countries that all persons born in the colonies had a right, upon the happening of such an event as the revolution, to elect to which government they would adhere; the point upon which they differed being that

the English courts considered the date of the treaty of 1783 as the period when we ceased to be subjects, while our courts adopted as the era the day of the declaration of independence. In some of the states laws were passed soon after the declaration of independence, setting forth that all abiding in the state after that event, or after a certain specified period, and deriving protection from the laws of the state, owed allegiance to it. This was the case in New York, Massachusetts, Pennsylvania, and New Jersey. In other states no special laws were passed, but each case was left to be decided upon its own circumstances according to the voluntary acts and the conduct of the party. It was also held that persons born in Great Britain who adhered to the American cause until the close of the war, became thereby American citizens; and that the natives of the colonies absent and living under the protection of Great Britain at the declaration of independence, but who returned to the country before the treaty of 1783, and continued here afterward, were citizens. This question of the alienage or citizenship of those born in the country before or during the war became a very important one, as it involved the right of succession to landed property, and was a fruitful source of litigation, until ultimately settled by the tribunals of both countries. In the articles of confederation there was a clause declaring that the free inhabitants of each state should be entitled to all the privileges and immunities of free citizens in the several states; and as each state had the power of determining for itself upon what condition aliens should be admitted, and as in some of the states higher qualifications were required by law than in others, it was felt that great inconveniences would arise in the practical operation of this provision. A single state had the power of forcing into another any alien upon whom it might confer the right of citizenship, though declared to be disqualified by the laws of that state. One state had but to naturalize him, and then, by the effect of the clause in the articles of confederation, he became a citizen in every other, thereby making the law of one state paramount to that of the rest. No actual difficulty occurred, but the most serious embarrassments were likely to arise at any moment. Therefore, when the federal constitution was framed in 1787, a provision was inserted without debate conferring upon congress the power of establishing one uniform rule of naturalization throughout the United States; and at the second session of the first congress after the adoption of the constitution, on March 26, 1790, an act of the most liberal character was passed, authorizing the naturalization of any free white alien after a residence of two years under the jurisdiction of the United States, and of one year in the state where he applied for admission; and from that time to the year 1872 some 18 acts were passed upon the subject. In 1795 the period of residence

was increased to five years, and a previous declaration upon oath by the alien of his intention to become a citizen was required to be made before a court of one of the states, at least three years before the applicant's admission. In 1798 the residence was increased to 14 years, with five years' previous declaration of intention. In 1802 the residence was reduced again to five years and the declaration of intention to three years; and in 1824 the declaration of intention was further reduced to two years. It was supposed in some of the states that they still had concurrent jurisdiction, and Virginia adopted a conflicting statute in 1790; but it was held by the supreme court of the United States in 1817 that the power to naturalize was vested exclusively in congress. The soundness of this decision was much questioned at the time, but it is now universally acknowledged to have been correct. But though no state can confer upon any alien all the rights and privileges of a citizen of the United States, it may grant him any civil or political privileges within its own jurisdiction not inconsistent with the laws of the United States; and in many, especially in the western states, aliens are allowed to hold land, to exercise the elective franchise, and to enjoy many of the privileges of citizens; a liberal policy which has contributed greatly to the rapid settlement of these states, and to their increase in wealth and prosperity.—Until the enactment of the revised statutes in 1874, the laws of the United States on the subject of naturalization had to be gathered from many statutes, some of them relating to other subjects; and the want of one general act, in which the whole law should be embodied and clearly expressed, was much felt. The qualifications requisite, and the mode of obtaining naturalization, are at present (1875) as follows. The applicant must have resided in the United States for the continued term of five years next preceding his admission, and one year at least within the state or territory where the court is held that admits him. Two years at least before his admission he must declare on oath or affirmation, before a court of record having common-law jurisdiction and a seal and clerk, or before a circuit or district court of the United States, or before a clerk of either of the said courts, that it is *bona fide* his intention to become a citizen, and to renounce for ever all allegiance and fidelity to any foreign prince, potentate, state, or sovereignty, and particularly by name the prince, potentate, state, or sovereignty of which he is at the time a citizen or subject. This declaration is recorded by the clerk, and a certificate under the seal of the court and signed by the clerk that he has made such a declaration is given him, which is received thereafter as evidence of the fact. If the applicant was a minor under the age of 18 years when he came to the country, this previous declaration of intention is dispensed with, and he is entitled to be admitted after he has ar-

rived at the age of 21 years, if he has resided five years in the United States, including the three years of his minority, and has so continued to reside up to the time when he makes his application, upon complying with the law in other respects. There is some obscurity in this latter provision. Some have thought that the three years of minority, from 18 to 21, is all that can be allowed as a part of the five years' residence demanded by the act, and that one naturalized as a minor was not entitled to be admitted until he had arrived at the age of 23; but it has been decided in the New York common pleas (all the judges concurring) that he is entitled to be admitted at 21, if he had resided here since he was 15; that all that the statute requires is, that he must in every case have resided here between the ages of 18 and 21, and if he has done that, and also resided here two years before that period began, it is a residence of five years within the meaning of the act. By an act passed in 1862 an alien who has enlisted in the armies of the United States, either in the regular or volunteer service, and who has been honorably discharged, may, upon proof of one year's residence in the United States and of good character, be naturalized without any previous declaration of intention. By the act of June 7, 1872, any seaman who declares his intention in a competent court to become a citizen, and who thereafter serves for three years on board of a merchant ship or ships of the United States, can, upon the production of a certificate of his discharge and good conduct during that time and of his previous declaration, be naturalized; and for the purpose of protection he is deemed a citizen after the filing of his declaration of intention to become one. When the applicant has completed the necessary residence, he must prove the fact before one of the courts previously named by other testimony than his own oath. One witness, if he knows the fact, is sufficient. If entitled to admission without a previous declaration of intention, the alien must declare upon oath, and prove to the satisfaction of the court, that for the three years next preceding his application it was *bona fide* his intention to become a citizen; and every applicant must prove (which may be done by his own oath, unless the court should require other testimony) that he has behaved during the period of his residence as a man of good moral character, attached to the principles of the constitution of the United States, and well disposed to the good order and happiness of the same. The mode of admission is as follows. The applicant goes to the clerk of the court, and exhibits the certificate of his having declared his intention. The clerk then prepares a written deposition for the witness, setting forth his knowledge of the applicant's residence and of his good character, and another for the applicant, declaring that he renounces all allegiance to every foreign power, and particularly that of which he is a citizen or subject, and, if he

has borne any title of nobility, that he renounces it, and that he will support the constitution of the United States. The parties are then taken before the judge, who examines each of them under oath; and if he is satisfied that the applicant has resided in the country for the requisite period, and is a man of good character, he makes an order in writing for his admission. The depositions are then subscribed by the parties and publicly sworn to in court in the presence of the judge; and the certificate of the declaration of intention, the depositions, and the order of the judge are filed, and constitute the record of the proceeding. A final certificate under the seal of the court, signed by the clerk, is then given the alien, declaring that he has complied with all the requisites of the law, and has been duly admitted a citizen; which certificate is conclusive evidence thereafter of the fact. In the case of a minor the previous declaration of intention is dispensed with, but in all other respects the course of procedure is the same. The record of naturalization, if regular upon its face, is conclusive as to the naturalization of the alien, and cannot be contradicted by extrinsic evidence. It may be set aside, however, if fraudulently obtained, by the court in which the alien was naturalized; and a very elaborate and effective act was passed July 14, 1872, making it a felony to obtain or knowingly to assist in obtaining a fraudulent naturalization. Acts have been passed for the admission of persons residing in the United States before certain dates without previous declaration of intention; but they have all become obsolete by lapse of time, except possibly the last, relating to those so residing prior to June 18, 1812. A child born out of the United States is a citizen if the father was one at the time of the birth of the child, but the right will not descend to one whose father has never resided in the United States; and the minor children of persons naturalized, if the children are then dwelling in the United States, become citizens by the naturalization of the parent. It was formerly questioned whether this latter provision applied to any but the children of parents naturalized before the passage of the act in 1802. Chancellor Kent, in his "Commentaries," inclined to the opinion that the act was prospective, and was designed to embrace the children of persons who should thereafter be naturalized; and opinions to the same effect were expressed by many eminent jurists. But the point came up for decision in the court of chancery of the state of New York in 1840, in the case of children who were minors, living with their father in this country, when the father was naturalized in 1830, and whose right to succeed to his estate was denied upon the assumption that they were aliens. Chancellor Walworth decided that they were not aliens, but became citizens in 1830 by the naturalization of their father. After an elaborate examination of the legislation of congress, he held that the provision in

the act of 1802 was prospective, so as to embrace the children of aliens naturalized after the passage of the act, as well as the children of those who were naturalized before. Decisions to the same effect were rendered by Chief Justice Daly in the New York court of common pleas in 1847; by the supreme court of Arkansas in a case of great public interest in which the question was elaborately examined, in 1850; and by the supreme court of Florida in 1865. Another important question under this provision is whether both parents should be naturalized to confer the right upon children. The importance of this question is greatly lessened in cases of naturalization after Feb. 10, 1855, as congress on that day passed an act declaring "that any woman who might be lawfully naturalized under the existing laws, married or who shall be married to a citizen of the United States, shall be deemed and taken to be a citizen;" but before that time the American courts had repeatedly held that a wife who was an alien did not become a citizen by the naturalization of her husband. These two questions are of great practical importance, as vast numbers of persons since the enactment of this provision have inherited, purchased, and transmitted real property upon the assumption that they were citizens by the naturalization of their fathers, whose rights, and the rights which others have derived from them, would be disturbed if a different construction were now given to this provision; and although these two questions have not been decided by the highest authority in this country, the supreme court of the United States, it may nevertheless be assumed that they are now settled, and the construction above stated universally acquiesced in. A doubt arose whether the act of 1855 applied to a woman who was married to her husband before he was naturalized, the language of the act being, "married or who shall be married to a citizen." The supreme court of the United States decided that these words refer to a state of marriage, and not to the time when the ceremony was performed; that whether married before or after the naturalization of her husband, the wife becomes by his naturalization also a citizen, it being the manifest intent of the act that the citizenship of the wife should follow as a consequence of the naturalization of the husband; and it was decided in North Carolina in 1869 that a white woman, a native of Ireland, who married an American citizen, was a citizen of the United States, although she had always resided in Ireland. If an alien who has declared his intention dies before he is naturalized, his widow and children may become citizens by simply taking the oath required of all naturalized citizens to support the constitution of the United States, and to renounce all previous allegiance. In this case the period of residence of the widow and children is immaterial, nor is any distinction made between minor children and adults.—In certain cases aliens are disqualified

from becoming citizens. No alien can be admitted while his country is at war with the United States, nor could one be admitted who was legally convicted of having joined the British army during the American revolution, or who was proscribed by any state before 1802, unless with the consent of the state. The statutes formerly provided only for the naturalization of "free white" persons, which is supposed to exclude all that can be denominated colored races—the copper-colored natives or Indians of America, the African races, and the yellow races of Asia. It has been held by the courts of California that a Chinese is not a white person within the meaning of the act, and cannot therefore be naturalized. In the celebrated Dred Scott case the supreme court of the United States in 1856 held that the Africans imported into the country and their descendants were a subjugated race, and not the people by whom the government was established; that they were not and never were intended to be embraced under the denomination of citizens; and that when the right to naturalize was surrendered by the states to the federal government, it was meant to be confined to persons of foreign birth, and not a power to raise inferior races here to the rank of citizens, such as Indians, negroes, and mulattoes, though upon this latter point the judges differed. Indians, and persons of mixed Indian and African blood, have however been admitted to the rights of citizenship by special treaties and acts of annexation. This was done by article 14 of the treaty with the Choctaws of Sept. 27, 1830; by article 12 of that with the Cherokees of May 23, 1836; and in the treaties by which Louisiana, Florida, and California were acquired. A delicate question arose as to the degree of mixture or color which would preclude one from being denominated a white person. There was no agreement on the subject even in the slave states. In some the proportion was one eighth, in others one fourth; and in South Carolina any distinct and visible admixture of negro blood, to be determined by the evidence of features, complexion, and parentage, was sufficient. On the other hand, in the free state of Ohio any one being nearer white than black, that is, having more than one half white blood, was declared to be white. The question has ceased to be of its former importance since the adoption in 1868 of the fourteenth amendment of the constitution of the United States, which declares that all persons born or naturalized in the United States and subject to the jurisdiction thereof are citizens of the United States and of the state wherein they reside, and that no state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States. It was held by the supreme court of the United States in 1872, in the slaughter house cases, that this enactment was primarily intended to confer citizenship on the negro race; secondly, to give definitions of citizenship of the United

States and of the states; and that it recognizes the distinction between the two. Since the act of July 14, 1870, aliens of African nativity and persons of African descent may be naturalized. The question however remains, under the laws, what admixture of color will preclude one from being denominated a white person, and may arise when persons of mixed Indian blood born out of the United States apply to be naturalized.—The residence required by the naturalization laws is a permanent abode in the country; and when that is established or begun, it will not be affected by a temporary absence upon business or pleasure, if the intention to keep up the residence here and return has always existed, and no residence has been established elsewhere. A man's residence may be defined to be the place where he abides, with his family if he has one, and makes the chief seat of his affairs and interests. In respect to seamen who have no fixed place of residence, they are provided for in the act of 1872 before referred to.—Many questions have been decided by the courts in respect to naturalization, which will be summarily stated. Foreigners by birth are *prima facie* aliens, and must show that they have been naturalized before they can inherit; and if not entitled to inherit, being aliens, they cannot become so by afterward getting naturalized. The marriage of an American woman with an alien does not make her an alien; but if she emigrates to a foreign country with her husband and takes up her abode with an intention to remain there permanently, she would probably be regarded as having lost the character of an American citizen, at least while such a state of things existed, especially if in the country in which she dwells she is by its laws a citizen or subject there, by being married to a citizen or subject of that country. Emigration to another country, swearing allegiance to it, and entering and uniformly continuing in the service of its government, are sufficient to show expatriation, and that the person has lost the character of an American citizen. A child born in a foreign country, whose mother was a native of that country, and whose father was an American citizen who went there with the intention of remaining, but was never naturalized there, is an American citizen, and can inherit property in the United States. A child born of non-resident parents, if born in one of the United States, is *prima facie* a citizen, although his mother was in the state merely for the purpose of being confined. A child born abroad of an American citizen is subject to a double allegiance; but upon arriving at maturity he may elect one and repudiate the other, and such election is conclusive upon him. Allegiance in the United States is twofold, to the Union and to the particular state; but that to the Union is paramount. Where a territory is conquered, it operates to change the allegiance of the people; but their relation and rights in respect to each other remain undis-

turbed. Citizens of Texas before the annexation became citizens of the United States by that act, which operated as an act of naturalization; and it was decided in Pennsylvania that a native of Saxony who went to Louisiana in 1801, and was residing there when the territory was ceded to the United States in 1803, and continued to reside there afterward, became by the act of cession a citizen of the United States. A court having neither clerk nor recording officer distinct from the judge is not a court entitled to naturalize.—As to the right of a citizen or subject to expatriate himself and renounce his allegiance to his native country, there was formerly even in the United States great difference of opinion. The most authoritative writers upon the law of nations treated it as an inherent right, and it was so regarded in many of the European nations. In England, however, it was held by the courts that the allegiance of a native-born subject was intrinsic and perpetual, of which he could never divest himself by any act of his own, and that it was not in the power of any foreign prince or nation, by naturalization, to dissolve the bond between a British subject and the crown. In the supreme court of the United States the question was elaborately discussed in three cases, but was not passed upon, while in the state courts there were conflicting decisions. Chancellor Kent in his "Commentaries," after reviewing all the decisions, declared the better opinion to be that an American citizen could not renounce his allegiance without the consent of the government in a mode prescribed by law; and as congress had passed no law, that the rule of the English common law remained unaltered. On the other hand, the executive branch of the government recognized the right. Gen. Cass, the secretary of state, did so in 1859; and Attorney Generals Cushing and Black both officially advised the government that an American citizen could renounce his allegiance. Finally an act of congress was passed July 27, 1868, declaring expatriation to be an inherent right in all men, and that any act of any officer of the government which denied, restricted, impaired, or questioned it was inconsistent with the fundamental principles of the government. In the same year it was settled by treaty between the United States and the North German Union that if a citizen or subject was, after a residence of five years, naturalized in either country, he was to be deemed a citizen of that country; that if he returned to the land of his birth, he could not be prosecuted for any criminal offence unless it was committed before his expatriation; and that by a residence of two years in the country to which he originally belonged, with no intention of returning to the one of his adoption, he would be presumed to have renounced his naturalization. In 1870 Great Britain, by an act of parliament, which will be hereafter referred to, abandoned its former policy; and the right of

expatriation and the renunciation of allegiance is now recognized in the United States, Great Britain, France, Russia, Germany, Austria, Italy, Spain, Belgium, Holland, Denmark, Sweden, and Norway; but in some of these countries it is subject to the condition that the native has fulfilled the obligations imposed by his former allegiance, such as military service. —In Great Britain, prior to 1844, naturalization could be effected only by act of parliament. Originally it conferred all the rights of a natural-born subject, but by an act dictated by the jealous policy of the government upon the accession of the house of Orange, passed in 1701, it was declared that no one, though naturalized, should be of the privy council or a member of parliament, or hold any office civil or military, or be allowed to receive any grant of land from the crown. As before stated, the king might grant letters of denization conferring certain limited rights, in the exercise of his royal prerogative. In this state the law remained until the reign of Victoria. Great desire having been expressed for more liberal enactments, the subject was referred to a committee of parliament, who made an elaborate investigation, and a law was passed in 1844 defining the privileges of aliens upon some questionable points, and providing for the naturalization of all aliens residing in or coming to Great Britain with intent to settle. The provisions of this act need not be enumerated, as they were superseded by a more comprehensive act passed in 1870, which repealed a number of the preceding laws. By the latter act any alien who has resided for five years in the United Kingdom, or has been for that period in the service of the crown, and intends after naturalization to continue in that service or to reside in the United Kingdom, may, upon producing such evidence of his residence, service, and intention as shall be satisfactory to one of her majesty's principal secretaries of state, receive from such secretary a certificate of naturalization, which shall take effect after the alien has taken the oath of allegiance; upon which he shall be entitled to all the rights and be subject to all the obligations of a natural-born subject, but shall not within the limits of the foreign state of which he was a subject be deemed a British subject, unless he has ceased to be a subject of that state by its laws or by treaty. The secretary of state may grant or refuse the certificate without giving any reasons, and from his decision there is no appeal; and he may grant a special certificate of naturalization to any person, in respect to whose nationality as a British subject there is any doubt, which is not to be an admission that he was not previously a British subject. This act contains many important provisions in respect to alienage and expatriation. It provides that aliens may acquire, hold, and dispose of real and personal property in the same manner in all respects as naturalized British subjects, and that

it may be derived from or through them in all respects as from or through natural-born subjects. This however does not extend to property out of the United Kingdom, nor confer upon them any municipal, parliamentary, or other franchises, or entitle them to hold office. It declares that any British subject in a foreign state, who was not under any disability, and who has voluntarily become naturalized in that state, shall cease to be a British subject; that any person who by his having been born in the dominion of the queen is a British subject, but who at the time of his birth was also by its laws, and is still, a subject of a foreign state, may cease to be a British subject by making a declaration of his alienage in the presence of any diplomatic or consular officer in the service of the queen, or if such person is in the United Kingdom before a justice of the peace, or if he is elsewhere in her majesty's dominions before any officer authorized to administer an oath; and that where a convention to that effect has been entered into by the queen with a foreign state, any subject or citizen of that state who has been naturalized as a British subject may in like manner make a declaration of alienage, upon which he shall cease to be a British subject, and shall be thereafter regarded as a citizen or subject of the country to which he originally belonged. Under this act also a married woman is to be deemed a subject of the country of which her husband is a subject. If she is a widow and was born a British subject, she may obtain a certificate of admission to British nationality. The children of British subjects naturalized in a foreign country, who during infancy became resident of the country where their father or mother was naturalized, and who according to the laws of the country became naturalized therein, are to be deemed citizens or subjects of that country and not British subjects: and when the father, or the mother if a widow, has been readmitted to British nationality, the children, if they have become residents during infancy in the British dominion with the father or the mother, resume their position of British subjects; and if the father, or the mother if a widow, become naturalized, the children are deemed British subjects if they during infancy become residents with their father or their mother in any part of the United Kingdom. And finally all laws made in the British colonial possessions respecting naturalization are to have the authority of law, but are subject to be confirmed or disallowed by the queen like other colonial laws.—In the various British colonies naturalization is either granted by the governor, or by a special act or ordinance of the colonial legislature or council, in each instance, or it is regulated by a general local law. It is granted by the governor in Jamaica, the Bahamas, Antigua, Turk's and Caicos islands, Newfoundland, Victoria, South Australia, Tasmania, and New Zealand; by a special act or ordinance in each case in West-

ern Australia, British Guiana, Barbadoes, St. Vincent, St. Lucia, Grenada, Trinidad, and generally in the minor West India islands. In Antigua, Grenada, and St. Vincent immigrants from the United States and British North America, of African descent, who have served under a contract for a year, can after three years' residence become naturalized by taking the oath of allegiance before the governor and secretary of the colony. In Sierra Leone it is regulated by an act of the imperial parliament. In New South Wales, Bermuda, and Honduras, it is, making the necessary changes, the same as under the English act of 1844. In the following colonies it is regulated by a general local law: Canada, St. Christopher and Anguilla, Turk's and Caicos islands, and Cape Colony. In Canada and Cape Colony a certain period of residence is required. In all the colonies an oath of allegiance is taken and a few other formalities are requisite. In Canada an oath by the applicant of three years' residence with intent to settle, and an oath of allegiance, are taken before a justice of the peace. The justice transmits a certificate that the requisite oaths have been taken to the court of the city or place where the applicant resided on the first day of its sitting; this is publicly read in court, and if no valid objection is made the certificate is filed and the act of naturalization is complete. The effect of naturalization by the local government of a colony or country forming part of the dominions of the crown of England, was considered in a case arising in the reign of Charles II., *Craw against Ramsey*, reported in *Vaughan's Reports*. It was declared in that case that a person naturalized by the parliament of Ireland, or naturalized in Scotland, which at that period was an independent kingdom, connected with England only by the circumstance that the crowns of both kingdoms centred in one person, did not thereby become a naturalized subject in England; that the effect of such a naturalization did not extend beyond the limits of the country where it was conferred, and that this applied to all the colonies or dependencies of the crown of England. It was also held in two cases before the privy council, in 1834 and 1837, one of which arose in the island of Mauritius and the other in Canada, that the status or political condition of a person resident in one of the British dependencies was to be determined by the law of Great Britain, but that the rights or liabilities which attached to it, when ascertained, depended upon the law of the particular colony.—The policy of France upon this subject has been restrictive, which may be traced in a great degree to the unfavorable influence exercised by foreigners at various periods of her history. Many Italian adventurers were naturalized in the reign of Charles VIII., but their characters were so worthless that their certificates of naturalization were annulled by his successor Louis XII. in 1499. At the time of the league great numbers of naturalized Spaniards and

Italians mingled in public affairs, and gave such offence, especially as a branch of the clergy, that a law was passed in 1579 prohibiting foreigners from holding ecclesiastical offices. Their participation in the civil administration of the state reached its climax when the notorious Italian Concini, the *protégé* of Maria de' Medici, became a marshal without ever having drawn a sword, and minister, ruling with capricious insolence a people of whose laws he was ignorant. After his tragical end in 1617, an act was passed debarring foreigners from holding a seat in the administration; and the mischief wrought by Mazarin and his foreign camarilla led to a still more stringent law in 1651. No material change took place until the revolution, when in 1791 the legislative assembly was authorized to naturalize foreigners upon the condition that they fixed their residence in the country and took an oath of allegiance. In 1793 a law was enacted admitting all to the rights of French citizens who had been domiciled in the country one year, over the age of 21, who supported themselves by their labor, or acquired property, or who should marry a native, or adopt a French infant, or support an aged person, and all others whom the convention regarded as meriting well of humanity. In 1798 a residence of seven consecutive years was made necessary; and as the country gravitated toward monarchy in 1800, the residence was extended to ten consecutive years. In 1803 the residence was reduced to one year, if the alien had rendered important service to the state by his talents, inventions, useful industry, or by forming large establishments therein. In 1808 it was provided that naturalization upon the ground of important services to the state, thereafter known as *la grande naturalisation*, should be conferred by a decree ratified by the council of state. In 1814 it was declared that no naturalized subject should be eligible to a seat in the legislative chambers, unless he had received the grand naturalization. After the revolution of 1848 the term of residence was reduced to five years, and in 1867 it was further reduced to three years. As the law now stands, the grand naturalization after the residence of a year, in the cases already mentioned, is conferred by a decree of the executive, and ratified by the legislature. In other cases the alien must have attained the age of 21, must have resided in France for three consecutive years under the authorization of the government, and have declared his intention of fixing his residence there; and the application must be made in the manner provided for by the decree of 1809. A child born in France of foreign parents, or the child of French parents born abroad, may reclaim the rights of citizenship on attaining the age of 21, if he resides in France and declares his intention of there fixing his domicile, or if, residing abroad, he makes a similar declaration and establishes himself in France within

the year that he makes his declaration. A foreign woman marrying a native becomes a French subject, and a French woman marrying a foreigner follows the condition of her husband; but becoming a widow, she recovers her nationality if living in France, or if she returns to it with the authority of the executive, and declares her intention of fixing there her residence. A foreigner living in France enjoys the same civil rights that are accorded to Frenchmen in the country to which the foreigner belongs. Citizenship is lost by naturalization elsewhere, by accepting office or a pension under another government without the authority of the executive, or by so establishing one's self abroad as to indicate an intention not to return; but dwelling abroad for commercial purposes does not have that effect. Citizenship may be recovered by renouncing the foreign office and domicile, on due application to the state, upon declaring an intention to fix a residence in France and renouncing all distinctions contrary to its laws. A difference is recognized since 1823 between letters of naturalization and letters of nationality, the former conferring a new right, the latter merely restoring a right that was lost or in abeyance. All Frenchmen, whether naturalized or holding office abroad with the consent of the executive, who are taken bearing arms against France, suffer the penalty of death; it constitutes no exemption that they were serving in obedience to the laws of their adopted country. Not only in this provision, but upon naturalization of foreigners generally, the policy of the government is in practice very illiberal. In 1852 a difficulty arose between the governments of the United States and France, upon the claim of the latter to compel a Frenchman naturalized in the United States to serve in the French army. At the earnest remonstrances of the American minister, the case was investigated by the French minister of war, and he was of opinion that the claim of the government of France could not be supported, but he left the matter to be determined by the judicial tribunals. The question afterward came before the French courts in the case of two natives of France naturalized in the United States, who upon their return to their native country had been compelled to enter the French army; and after a full examination of the whole subject, it was decided that as France recognized the right of expatriation, it followed as a consequence that it could have no claim upon a native of France who by naturalization became the citizen of another country; that by being naturalized a Frenchman changed his allegiance and lost his native character, and could not on returning to France be compelled to serve in the army, or perform the obligations required of a French subject or citizen. The decision was approved by the imperial government, and the men were discharged.—In Belgium naturalization is granted by a legislative act. It is of two kinds, grand and ordinary. The first

is conferred only where eminent services have been rendered to the state, and the person to whom it is granted is placed in every respect upon an equality with a native. The second naturalization, *ordinaire* or *petite*, admits to every privilege except the exercise of those political rights which are reserved for the grand naturalization. In contradistinction to France, the policy of the Belgian government on this subject is distinguished by great liberality. In the Netherlands, by the fundamental law of 1848, a foreigner can be naturalized only by an act of the states general, approved by the king; but he acquires substantially the privileges of a subject if he has permission from the king to establish a domicile, and gives notice to the administration of a commune that he has established his domicile in that commune, with a declaration of his intention to settle in the kingdom, and retains his domicile in the same commune for six years. In neither country is any stated period of residence demanded, or any other special condition required; and citizenship in both may be lost for the same causes as in France, and restored in the same way.—In Sweden, by a law passed in 1858, an application must be made by petition to the king, accompanied by proof of the age of the petitioner, his religion, his native country, the time of his immigration, the places where he has resided in Sweden, and his general good conduct. He must be 21 years of age, of good character, a resident of Sweden for three years, must have the means of supporting himself, and must not be of the Roman Catholic religion. If he has been previously admitted into the service of the state, or is known as a man of more than ordinary ability in the arts or sciences, or in the industrial pursuits of agriculture or mining, or if for other reasons it is considered that his adoption as a Swedish subject would prove useful to the state, the three years' previous residence may be dispensed with. In Norway naturalization is granted by the *storting*, the national legislative assembly, in which this power is exclusively vested, the assent of the king in this case not being necessary; but any one who has definitively fixed his domicile in Norway, and resided there for ten years, has all the civil and political rights of a Norwegian subject. In Denmark a petition must be addressed to the president of the *rigsraad*, with a certificate of two citizens that the petitioner has resided one year in the country. An act is then passed by the *rigsraad*, declaring that the petitioner may reside and trade in the kingdom, with all the rights and subject to all the duties of a native-born subject. It must be approved by one of the ministers and receive the sanction of the king, and the privilege is almost invariably granted as a matter of course whenever applied for.—In Russia, by the law of 1864, a domicile of five years is requisite, which may be shortened in special cases. To acquire a domicile the foreigner must declare his wish to the gover-

nor of the province where he intends to reside, and explain the nature of his occupation in his own country and the pursuit he purposes to follow in Russia; upon the receipt of which declaration he becomes domiciled. When the requisite time has elapsed application for naturalization must be made to the minister of the interior, with whom it is optional to refuse or grant the petition. If granted, the alien becomes naturalized by taking an oath of fidelity to the emperor, and is then in respect to his rights and obligations upon a perfect equality with native-born Russians. He may if he wishes afterward renounce his naturalization on payment of all claims against him, governmental or private, and return to his native country or remain in Russia as a foreigner. Foreigners in the military or civil service of Russia, and ecclesiastics of foreign persuasions, are naturalized by taking the oath of allegiance without any fixed period of domicile. The oath of allegiance is merely personal, and does not affect children previously born, who however may be admitted upon the same terms as their parents. Children who are born afterward are Russians. Children of foreigners born and educated in Russia, or born abroad and educated in a Russian upper or middle school, may be naturalized a year after they have attained their majority.—As most of the German states are now incorporated in the German empire, their previous regulations respecting naturalization and citizenship have been modified by a comprehensive provision preserved from the constitution of the North German confederation adopted in 1867, which declared that citizenship should thereafter be subject to the regulations of the confederation and of its legislature; that a common right of citizenship prevailed in the confederation, and that the citizens of each constituent member of it should be treated as natives in all the others. A bureau has recently been established by the national government to which, it is said, this whole subject has been committed. As a general rule, under the regulations formerly in force, naturalization was granted if the applicant had been released from his former allegiance, or had been allowed by his government to emigrate; if he were of good character, and had discharged all his obligations in the particular state to which he belonged, such as paying his debts and fulfilling his military duty, which latter condition was required only of those from other German states. Application was made in writing to the council of the city or village where the applicant resided, showing that he came within the above requirements. The petition was closely scrutinized, and if favorably regarded was sent with a report to the highest authority in the state, and a diploma signed by the proper minister was transmitted and given to the petitioner upon the payment of a small fee. If the petition was refused by the local authorities, it was simply sent back, but the reasons

were given if applied for. An appeal might be taken, but was of little value, as the decision of the local authorities was almost invariably affirmed. In Prussia, by a law of 1842, the superior administrative authorities are empowered to naturalize any stranger who satisfies them of his good conduct, certain exceptions being made. Citizenship is acquired by nomination to a public office, or by the marriage of a foreign woman with a Prussian. The quality of a Prussian subject is lost by his being discharged upon his request, which is not granted to males between the ages of 17 and 25 years without a military certificate that the application is not made to avoid the performance of their military duty. It is also lost by the sentence of a court, by living ten years in a foreign country, by entering a foreign service without the permission of Prussia, or by the marriage of a female subject with a foreigner. If there is no special exemption, the certificate of discharge comprehends the wife and the minor children that are still under their father's authority.—In Austria, a foreigner acquires the rights of citizenship if employed as a public functionary, but not by mere admission into the military service, nor by receiving a title of distinction or honor, but is treated as a citizen if maintained by the government on account of military services. The right may be conferred by the superior authorities upon an individual after ten years' residence without interruption, upon proof of the fact and upon taking the oath of allegiance. The authorities, however, may grant it before the expiration of that period upon proof of good moral character and of the applicant's ability to support himself; and foreigners acquire the rights of citizens by entering into business requiring a permanent residence. The temporary possession of a farm, however, of a house or other real estate, or the mere establishment of a manufactory, or a commercial business, or a partnership, does not confer the right. An emigrant who has left the empire by permission of the authorities, with the intention not to return, forfeits his privileges as a subject. Marriage with an Austrian confers citizenship upon the wife.—In Switzerland, under the constitution of May 29, 1874, a foreigner obtains citizenship, and thereby equal rights with the citizens in all cantons, by paying a fee in any commune, varying from about \$4 to \$300, according to the amount of communal property.—In Portugal, an application must be made to the king through the secretary of foreign affairs, which is referred to the council of state. The applicant must be over 25 years of age, have resided in the country one year, and have the means of subsistence. The year's residence may be dispensed with if he is of Portuguese blood, or upon proof that he has married a Portuguese, or been useful to the state by embarking in commerce, improving any branch of the arts, or introducing any new trade, manufacture, or

invention, or by opening or improving a public road; and they are generally dispensed with in the case of mariners, as it has been the constant policy of Portugal to encourage foreigners to enter and augment its marine.—In Spain, by the ancient law of the realm, no foreigner could be naturalized. The constitutions of 1837 and 1845, however, included in their classification of Spanish subjects those who should receive letters of naturalization, and provided for the enactment of a law declaratory of the conditions upon which such letters would be granted. The present state of the law appears to be unsettled or difficult to ascertain.—Before the various Italian states were formed into the kingdom of Italy, each state had its own regulations in respect to naturalization. In the Two Sicilies ten years' consecutive residence was required, but special naturalization might be granted after one year's residence to any one who had rendered important service to the state. In Sardinia it was granted after five years' residence if the applicant had purchased real estate or was engaged in some useful commercial business. The pope in the Papal States and the king in the Neapolitan dominions might naturalize whom they thought proper; but the exercise of the power was rare, and when it took place was usually upon the same conditions as in Sardinia, except that none could be admitted but Roman Catholics, while in Sardinia no distinction was made on the ground of religion. According to the revised code of the kingdom of Italy of 1866, aliens may become naturalized citizens either by a special act of parliament or by a royal decree. The decree to be effectual must within six months after its date be registered with the proper civil authority of the state in the place where the alien has established or intends to establish his domicile, and the alien must also within that period take an oath before the same authorities that he will be faithful to the king and observe the statutes and laws of the realm. The code does not contain any further regulations on the subject, but the government has discretionary power for taking such informations as each application may seem to require. Hence the necessity of a special act of parliament or a royal decree for each individual naturalization. There is in Italy, besides the national citizenship, a local one, as every Italian citizen must be enrolled in the lists of the district in which he is subject to taxation and conscription; citizenship in fact being of the same general nature as the German burgher right. By the national code above referred to of 1866, if the father is unknown, the child of a citizen mother is a citizen; and if the mother is unknown and the child was born in the kingdom, it is a citizen. A child of an alien who has had an uninterrupted domicile in the kingdom for ten years is a citizen; also the child of a citizen who has lost his citizenship before the birth of the child, if the child was born and resides in the kingdom. In such cases, however, the

child may elect to be considered an alien, upon making a declaration to that effect in a mode prescribed. A child born abroad before his father lost his citizenship is an alien; but he may elect to take the quality of a citizen by making a declaration in a form prescribed and establishing a domicile in Italy for a year; or he is regarded as a citizen if he has served in the Italian army or navy, or accepted public employment in the kingdom, or satisfied the requirements of the conscription without seeking exemption as an alien. If an alien has not established his domicile for ten years, his child is an alien, but by making the prescribed declaration may become a citizen. Citizenship is lost: 1, by making a formal renunciation of it before the civil authority of the province where the person resides and emigrating; 2, by accepting employment from a foreign state or entering its army, without permission of the Italian government; 3, by naturalization in a foreign country. The wife and minor children of one who has lost his citizenship are aliens, unless they have continued to reside in the realm. Citizenship may be restored: 1, by returning to the realm with the permission of the government; 2, by renouncing foreign citizenship, or the employment or military service of a foreign power; 3, by declaring an intention before the proper authority to establish a domicile in the realm, and establishing it within a year.—In Greece, by a law passed May 15, 1835, any foreigner may become a Greek citizen by making a declaration of his intention before the authorities of the deme in which he resides, and after a continued residence in the country for three years from the day when he declared his intention. Upon the expiration of the three years he is naturalized by taking an oath before the prefect of obedience to the laws and of fidelity to the king. From the period of declaring his intention he enjoys all civil rights, and Grecian citizenship may be conferred without expense upon any foreigner who has rendered distinguished service to the state. Any person born in Greece of foreign parents may, when arriving of age, become a Greek citizen by declaring his intention to make Greece his permanent home, and registering his name in a deme, or, if residing abroad, by making a similar declaration, and returning within one year thereafter to Greece and registering his name as above. Every one born abroad of a Greek father is a citizen of Greece; or if the father has lost his nationality, the son may become a citizen by making the declaration and registering his name as above stated. This law declares Greek citizens to be those born in the kingdom and of parents having the Greek nationality, and those who have acquired it by declaring their intention to become citizens; and that the nationality is lost by becoming a citizen of a foreign country, by bearing arms against Greece, or by entering the civil or military service of another nation without ob-

taining special permission from the king, or by a citizen establishing himself abroad in a manner which indicates an intent not to return, but no such intent is to be inferred simply from the fact that a citizen has established himself in another country for commercial purposes.—In Turkey the population is divided into two great classes, the Turks or Mohammedans, the ruling race, and the Rayas (the flock), who with the exception of some few tribes are Christians or Jews. The Rayas are organized in distinct communities, having their own municipal regulations, as Armenians, Bulgarians, Bosnians, Serbs, Latin Christians, or Jews, under a recognized head, as a bishop, patriarch, or other ruler, who is responsible to the sultan for the good conduct of his community. Resident foreigners might become members of one of these communities with the consent of the body, upon giving due notice to the Porte, and when admitted were entitled to the privileges and bound to the obligations of Turkish subjects. This however has probably been modified by a decree of the Ottoman empire of Jan. 19, 1869, which provides that the character of a Turkish subject may be obtained on application to the minister for foreign affairs, if the applicant is of age and has resided five years consecutively within the Ottoman empire, and that this condition may be dispensed with by the government in exceptional cases. By this decree also the nationality of the parents, or of the father, alone determines that of the child, irrespective of the place of birth; and it further provides that a person born of an alien on Turkish territory may within three years after arriving at age claim to become a Turkish subject. Foreigners, not members of one of the Raya communities, are aliens and under the protection of their respective consuls. The Mohammedans enjoy greater privileges than the Rayas, and foreigners of whatever creed or nation may be received into this class upon embracing Mohammedanism. Their naturalization was formerly both a civil ceremony and a religious rite. It consisted in going first to the Porte or the executive authority representing it, in putting on the fez cap, and making a public declaration of faith in the words: "There is no God but God, and Mohammed is his prophet;" and then repeating the same ceremony in the mosque. Circumcision was also required; and when these conditions had been fulfilled, the proselyte was invested with all the rights of a native-born Mohammedan subject. Whether this continues, or has been superseded by the decree of 1869, is not known. In Egypt, Persia, and throughout all the Mohammedan countries, naturalization is effected in the same way, either by embracing Mohammedanism or by being formally admitted a member of one of the other organized communities.—In the European states, with but a few exceptions which have been mentioned, a naturalized foreigner enjoys every civil and political right,

and may hold the highest office. In all of them naturalization is a thing of rather unusual occurrence, the number of foreigners who become permanent residents in any one of them being very limited. Those who do are chiefly devoted to commercial pursuits; and as naturalization, as a general rule, is not essential to enable them to carry on trade or commerce, it is not generally applied for.—In the different West India islands belonging to European powers, the authority to naturalize is generally either vested in the sovereign or his representative, or regulated by a local law. In the island of Cuba, by the Spanish ordinance of Oct. 21, 1817, the captain general may grant letters of license for domiciliation to all resident foreigners, upon their taking an oath of fidelity and submission to the law. These letters entitle them to hold real and personal property, and to the same protection in their persons and property as Spanish subjects; but for the first five years of domiciliation they cannot engage in trade, open a shop, or become owners of ships or vessels, unless in partnership with Spanish subjects. After that time they can become naturalized. They must present their original letter of license to the captain general, and avow their intention to make the island their perpetual residence; and if it appear after due inquiry by the government that they have resided constantly on the island for five years, and are of good moral character, letters of naturalization are granted to them after they have sworn fidelity to the Roman Catholic religion, to the crown, and to the laws, and renounced all foreign allegiance to and every privilege received from any other government. When thus naturalized, they and their legitimate heirs and descendants acquire all the rights and privileges, and are placed upon the same footing as natural-born subjects. But the provision in respect to naturalization, though still in full force, has become practically a dead letter, as natives enjoy but few privileges which resident or domiciled foreigners do not possess.—In Hayti, by a modification of the civil code adopted in 1860, any person who in virtue of the constitution wishes to become a citizen, must within a year after his arrival make an oath before a justice of the peace renouncing allegiance to every other government, upon presenting an official attestation of which at the office of the president of Hayti, he receives from that officer an act recognizing him as a citizen of the republic.—In Mexico two years' residence is required, and one year's previous declaration of intention. This declaration is in the form of a petition to the *ayuntamiento* of the place where the applicant resides. Before he can be naturalized, the applicant must prove before the nearest circuit judge that he is of the Roman Catholic religion, and has a trade, profession, or income sufficient to support him. The documents containing this proof must then be laid before the governor or political chief of the district or territory, and, if

satisfactory, letters of naturalization are granted by that officer to the applicant upon renouncing his former allegiance and swearing to support the constitution; but naturalization cannot be obtained while the country to which the applicant owes allegiance is at war with Mexico. Colonists who settle new lands can be naturalized a year after they have settled, and aliens in the naval service become citizens by taking the oath of allegiance. Citizenship in Mexico is lost by residing abroad for ten years without obtaining a prolongation of the permit to be absent; by accepting honors or offices from a foreign sovereign; by becoming naturalized in another country; by a citizen so establishing himself abroad as to indicate a manifest intention not to return; by a Mexican woman upon her marriage with a foreigner, and by the children of Mexicans born out of the country who do not claim the right before they arrive at the age of 26 years (but this is supposed to be unconstitutional since 1857). The adult children of Mexican parents who have lost their citizenship also lose the right, unless they claim it and reside one year in the country after their right to citizenship is recognized. Finally, any Mexican who in time of war hoists a foreign flag over his house, loses his citizenship, and is punished by banishment. The children of aliens born in Mexico follow the condition of their parents, and are not deemed citizens.—In Brazil three years' previous residence is requisite, after which naturalization is obtained by a joint resolution, which must pass both chambers of the general assembly and be affirmed by the emperor. By a law passed in 1860 children of foreigners born in Brazil have during their minority the political condition of their parents; but on reaching their majority they acquire the rights and become subject to the duties of Brazilian citizens. A Brazilian woman marrying an alien follows his condition, but upon becoming a widow is considered a Brazilian subject if residing in Brazil, or if, returning there, she declares her intention to fix her residence in the country; and a foreign woman marrying a Brazilian has the political condition of her husband. In the Argentine Republic two years' residence in the country is required, or the period may be lessened where services have been rendered to the state. In Peru the governor of a department may grant naturalization upon proof of good conduct, that the applicant has resided in Peru for one year, and that he comes within the requirements of the constitution, and upon his taking the oath of allegiance. In Chili five years' previous residence is necessary; but where an alien has married a native, this period is reduced to four years. In Paraguay foreigners who establish a character for prudence and discretion, and who are not political propagandists, may be naturalized with the consent of the president. In Bolivia citizenship is granted to those who renounce their former allegiance and inscribe their names upon the

civil register. In Venezuela it may be obtained by transmitting a memorial through the governor of a province to the executive, with legal proof of the applicant's good conduct and of his means of subsistence, the names of his wife and children if he have any, and that he has either resided one year in the territory or sailed for six months in a war or merchant vessel of the republic, or owns real estate of a certain value, or is married to a Venezuelan woman, or that he has rendered important service to the state. If approved, letters of naturalization are sent to the governor, who delivers them upon the applicant's taking an oath before him or before the *jefe politico* that he will obey the constitution and laws; and the wife and minor children become naturalized with him, their names and ages being indorsed upon the letters. In Ecuador a foreigner may be naturalized if he owns real estate or \$1,000 in money, or is engaged in some industrial pursuit, upon making known his intention to the governor of a province; in Colombia, by sending a memorial through the governor of a province to the executive, stating the applicant's nationality, and the names of his wife and children if he have any, and by taking an oath to obey the constitution and laws and renouncing his former allegiance, his wife and minor children becoming naturalized with him.—In the states of Central America the more general rule is, as in Brazil, to naturalize the alien either by the executive or by a legislative act. In Costa Rica an application must be made to the president of the republic, accompanied by proof that the petitioner has resided there six years, of his good conduct during that period, and of his having honest means of subsistence. Letters of naturalization are then granted him by the president on renouncing his previous national allegiance. In Honduras a foreigner is naturalized by acquiring real estate and a residence of four years, but if one marries a Hondurian wife this period is reduced to two years; or a letter of naturalization may be obtained from the legislature for services rendered to the state, for an important improvement in agriculture or the arts, or for introducing a new manufacture in the country. In San Salvador he is naturalized by acquiring real estate and a residence of five years, or by contracting marriage with a Salvadorian woman and a residence of three years, or by obtaining a letter of naturalization from the legislative body in the same way and for the same causes as in Honduras. In Nicaragua letters of naturalization may be granted by congress after two years' residence in the republic. In most of the states of Central America naturalization is granted by the legislature to resident foreigners generally upon application, without insisting upon any conditions; the clause that it is upon the ground of important services to the state, &c., being usually inserted in the letters of naturalization as a mere matter of form.—

In the foregoing enumeration some countries are omitted, because their laws could not be accurately ascertained, and many countries of Asia and Africa are not noticed for the reason that they have no regulations upon the subject. In the largest of these countries, China, foreigners are by the imperial code perpetually excluded, except within certain prescribed limits, unless where provision is made for more extended privileges by treaty.

NATURAL PHILOSOPHY, a term formerly used to include all those sciences which relate to the material universe, in contradistinction to those which relate to the mind or metaphysics. The wide extent of the term and its consequent vagueness have led to a gradual restriction of its application, until at present it embraces only mechanics and physics. For the former, see the article **MECHANICS**. The term physics is usually considered as including the sciences of hydromechanics, pneumatics, acoustics, heat, light, electricity, and magnetism. Each of these will be found treated in this *Cyclopædia* under its appropriate head.

NAUHEIM, a watering place of Hesse-Darmstadt, Germany, 17 m. N. of Frankfurt; pop. about 2,500. The salt works here are of great antiquity, but baths were first established in 1834, and the number of visitors is now about 3,000 a year. A fountain bored in 1838 down to the bed of natural salt gave out in 1848, but a new one soon took its place. In December, 1846, a slight shock of earthquake brought forth another fountain from a hole bored some years before. This affords water for the old and new bath houses, and produces annually 75,000 quintals of salt. A still more recent fountain, the Friedrich-Wilhelm's Sprudel, discharges a column of water 12 in. in diameter from the top of a shaft 15 ft. high. These waters, used both for bathing and drinking, are efficacious in diseases of the skin and bowels. The Kurhaus is a fine building surrounded by a park. Gaming tables, which formerly existed, have been abolished. The mineral waters of Nauheim and vicinity are largely exported.

NAUMANN, Johann Friedrich, a German ornithologist, born at Ziebigk, near Köthen, Feb. 14, 1780, died in Köthen, Aug. 15, 1857. He was the son of the ornithologist Johann Andreas Naumann, studied at Dessau, and devoted himself especially to the study of the birds of Germany. Besides other works, he published *Naturgeschichte der Vögel Deutschlands* (13 vols., Leipsic, 1822-'52), embellished by plates, a large number of which he engraved himself.

NAUMANN, I. Johann Gottlieb, a German composer, born at Blasewitz, near Dresden, April 17, 1741, died in Dresden, Oct. 23, 1801. When 13 years of age he went to Italy, and afterward settled in Venice, where he remained eight years, teaching and composing music. In 1765 he returned to Dresden, and was appointed composer to the elector of Saxony. Shortly after he made a second journey to Italy, and in 1772 a third, when he resided two years at

Rome, and in 13 months composed five operas. In his later years he composed much church music. Among his operas are "Cora," "Amphion," "Orpheus," and "Gustavus Vasa."

II. Karl Friedrich, a German mineralogist, son of the preceding, born in Dresden, May 30, 1797, died in Leipsic in January, 1874. He was educated at Freiberg, Leipsic, and Jena, made a scientific journey to Norway in 1821 and 1822, and published *Beiträge zur Kenntniss Norwegens* (2 vols., Leipsic, 1824). In 1826 he succeeded Mohs in the chair of crystallography at Freiberg, and in 1835 was also appointed professor of geognosy. In 1842 he went to the university of Leipsic as professor of mineralogy and geognosy, and in 1866 he was made privy counsellor of mines. Among his remaining works are: *Anfangsgründe der Krystallographie* (Dresden, 1841; 2d ed., 3 vols., Leipsic, 1854); *Elemente der Mineralogie* (8th ed., 1871); and *Lehrbuch der Geognosie* (1850; 2d ed., 3 vols., 1858-'67). **III. Moritz Ernst Adolf**, a German physician, brother of the preceding, born in Dresden, Oct. 6, 1798, died in Bonn, Oct. 19, 1871. He took his degree at Leipsic, and was adjunct professor there in 1824-'5, and subsequently in Berlin till 1828, when he became professor at Bonn. Among his works are: *Handbuch der medicinischen Klinik* (8 vols., Berlin, 1829-'39; 2d ed., 11 vols., 1839-'47); *Pathogenie* (3 vols., 1841-'5); *Allgemeine Pathologie und Therapie* (1851); *Ergebnisse und Studien aus der medicinischen Klinik zu Bonn* (2 vols., Leipsic, 1858-'61); and *Die Naturwissenschaften und der Materialismus* (Bonn, 1869). **IV. Emil**, a German composer and author, son of the preceding, born in Berlin, Sept. 8, 1828. He studied under Mendelssohn, and in 1848 produced his first important work, the oratorio *Christus der Friedensbote*. About 1852 he published *Die Umgestaltung der protestantischen Kirchenmusik*, and was soon after appointed director of church music at Berlin. Among his compositions are the cantata *Zerstörung Jerusalem's*, the operas *Judith* and *Mühlenhexe*, the overture to *Lorelei*, and many pieces of church music. He has published *Ueber die Einführung des Psalmengesanges in der evangelischen Kirche* (1856), and *Die Tonkunst in der Culturgeschichte* (1869-'70).

NAUMBURG, a fortified town of Prussia, in the province of Saxony, on the Saale, near the junction of the Unstrut, 23 m. S. S. W. of Halle; pop. in 1871, 15,120. It is an active manufacturing and commercial town, but the once famous fair of Naumburg has lost its importance. Among the principal buildings are the cathedral, one of the finest specimens of German mediæval architecture, remarkable for its lofty towers and double choir, completed in 1349, and the restoration of which was begun in 1874, and the church of St. Wenceslas, with a famous picture of "Christ blessing Little Children," by Cranach. It is the seat of the Protestant cathedral chapter of Naumburg-Zeitz, and has one Roman

Catholic and four Protestant churches, a gymnasium, and several other schools of a high grade. An annual children's festival is celebrated here, in commemoration of the raising of the siege by the Hussites under Procopius,

by a blow upon the head, and in sensitive persons by offensive odors, by sudden alternations of temperature, and even by disagreeable news or moral impressions. When followed by vomiting, it is usually relieved immediately

upon the evacuation of the stomach. If not so relieved, and if long continued, it becomes excessively depressing, and may even be dangerous to life. If the sensation of nausea be excited by any substance which has been taken into the stomach, the best treatment is to favor the act of vomiting by copious draughts of warm water, and thus secure an early and complete evacuation of the stomach. If it depends upon any other of the causes named, quiet, a horizontal position, and freedom from all sources of disturbance, are most effectual.



Naumburg.

which according to tradition took place July 28, 1432, in consequence of the entreaties of the children of Naumburg. This event has been dramatized in Kotzebue's *Die Hussiten vor Naumburg*, but its authenticity has been called in question by recent historians. Several treaties were concluded at Naumburg in the 15th and 16th centuries, and the town was of strategical importance during the thirty years' war and the wars of 1806 and 1813.

NAUPACTUS. See LEPANTO.

NAUPLIA, or **Napoli di Romania**, a seaport town of Greece, in the nomarchy of Argolis and Corinth, and capital of an eparchy of its own name, on the gulf of Argolis, 58 m. S. W. of Athens; pop. in 1870, 8,543. The three forts which protect it make it the strongest maritime town of Greece. It is the seat of a Greek archbishop, of a court of appeal, and of a court of primary jurisdiction. The town has seven churches, a gymnasium, and an arsenal. From 1824 to the end of 1834 it was the seat of the government of Greece. In 1831 Capo d'Istria was assassinated here, and in 1833 Otho, the first king of restored Greece, landed at the port. In antiquity Nauplia was the port of Argos.

NAUSEA (from Gr. *ναῦς*, a ship, from its presence in sea sickness), the sickening sensation at the pit of the stomach which usually precedes vomiting. Nausea may be produced by a variety of causes: by the introduction into the stomach of nauseating or emetic drugs, by continued rotation or swinging of the body, by the unaccustomed motion of a vessel upon the waves, by food which disagrees with the stomach either in quantity or quality, sometimes

NAUSETS. See MASSACHUSETTS INDIANS.

NAUSHON. See ELIZABETH ISLANDS.

NAUTILUS (Gr. *ναυτίλος*, from *ναῦς*, a ship), a name applied to both the tetrabranchiate and dibranchiate orders of the cephalopod mollusks. In the former the true or pearly nautilus is the best known species of the only living genus representing the extinct chambered shells (such



Pearly Nautilus (*Nautilus pompilius*).

as ammonites, orthoceratites, turrilites, &c.) which abounded during the primary and secondary geological ages; in the latter belongs the nautilus of the ancients (the paper nautilus of the moderns), more properly called argonaut. For the characters of the class and orders see CEPHALOPODA, and MOLLUSCA.—The

genus *nautilus* (Linn.) has a discoid, symmetrical, univalve shell, with simple aperture, suture, and siphuncle. The organization of the pearly nautilus (*N. pompilius*, Linn.) was first made known by Prof. Owen in 1832, and afterward by Gray, Grant, De Blainville, Van der Hoeven, Valenciennes, and Huxley. The posterior portion of the body, containing the viscera, is soft, smooth, and adapted to the anterior chamber of the shell; the anterior is muscular, including the organs of sense and locomotion, and can be retracted within the shell; the mantle is very thin behind, and prolonged through the calcareous tube of the occupied chamber as a membranous siphon, and through all the divisions of the shell to the central nucleus; on the upper part of the head is a broad triangular muscular hood, the back part excavated for the involuted convexity of the shell, protecting the head when retracted, and used as a foot for creeping at the bottom of the sea with the shell uppermost. On each side of the head are 20 perforated digitated processes of a conical form, each containing a long finely ringed tentacle, whose inner surface is closely set with narrow transverse plates; the eyes, large and prominent, are placed on short pedicels on the side of the head behind the digitations; the subocular processes have no tentacles, and are rudimentary external ears, their cavity extending to the auditory capsule. The mouth has two horny mandibles, like the beak of a parrot reversed, the lower overlapping the upper, moving vertically, and implanted in thick muscular walls; the surrounding circular fleshy lip has 4 labial processes, each pierced by 12 canals, containing each a small retractile tentacle, making, with the 38 digital and 4 ophthalmic, 90 tentacles on and around the head. The internal cartilaginous skeleton is confined to the lower surface of the head, a part of the cephalic nervous system being protected in a groove on its upper surface, and the two great muscles which fix the body to the shell are attached to it. The funnel is very muscular, and is the principal organ of free locomotion, the animal being propelled backward by a succession of jerks occasioned by the reaction of the ejected respiratory currents against the surrounding water. The capacious crop opens into an oval muscular gizzard; the intestine terminates in the branchial cavity near the base of the funnel; the liver is bulky, and the bile is derived from arterial blood; there is no ink gland. Sea water is admitted into the pericardium; the branchiæ are two pairs without branchial hearts, the larger branchia supporting 48 vascular folded plates on each side, the smaller 36; the large veins near the heart have clusters of follicles attached to them, according to Owen seeming to be homologous with the so-called renal glands of lower mollusks; by some they are considered as diverticula to relieve the circulation during the varying pressures to which the animal is subjected. The tongue is furnished with

numerous papillæ and spines. The nautilus, though the lowest of the cephalopods, approaches the vertebrate type nearer than any other invertebrate, in the perfect symmetry of the organs, the larger proportion of muscle, the increased bulk and concentration of the nervous centres in and near the head, the vertical opposition of the jaws, the gustatory papillæ of the tongue, and the cartilaginous cephalic skeleton. Its food consists of other mollusks and of crustaceans, showing that its natural habitat is the bottom of the sea, where it creeps about shell upward. The parts of the shell progressively vacated during the growth of the animal are successively partitioned off into air-tight chambers by thin smooth plates concave toward the opening, with sinuous margins, growing from the circumference toward the centre, and pierced by the membranous siphon. The young animal, before the shell becomes calcareated, cannot rise from the bottom; but the older ones can come to the surface by changes in the expansion of the soft parts, by a slight vacuum produced in the posterior part of the occupied chamber, and according to some by the exhalation of some light gas into the deserted chambers; they rise in the water as a balloon does in the air, with the ability also of directing the motions to a certain extent by means of the funnel; they float at the surface shell upward, and sink quickly by reversing the shell. The proportion of the air chambers to the dwelling chamber is such that the shell is nearly of the same specific gravity as the water; the siphon communicates with the pericardium, and is probably filled with fluid from that cavity; it conducts small vessels for the nutrition of the shell, and perhaps for secretory purposes. A large and perfect shell will weigh 6 or 7 oz., and the soft parts 5 or 6 oz. more; the exterior crust of the shell is whitish with fawn-colored streaks and bands, and the interior has a beautiful pearly lustre, and is in request by cabinet makers and jewelers; by removing the external coat by acids, the pearly surface is readily exposed, and shells thus treated and richly engraved were formerly highly prized as ornaments for the mantle-piece and sideboard. This species is so common in the S. Pacific, that at certain seasons of the year they are carried by the winds and currents to the island shores, where they are used, when smoke-dried, for food; in the Papuan archipelago the shells are used as common utensils; they are found from the Persian gulf and Indian ocean to the Chinese seas and the Pacific. In the umbilicated nautilus (*N. umbilicatus*, Lester) the last whorl of the shell does not envelop and conceal the others; the shape is ventricose, the surface reticulated, and the color dusky smoky, with numerous delicate chestnut flammules (five to the inch). A nautilus extended in a straight line would be a shell like a fossil orthoceras; in the ammonites the shell is coiled as in the nautilus, but is strengthened by arched ribs and dome-

shaped elevations on the convex surface.—The paper nautilus or argonaut belongs to the octopod group of the dibranchiate cephalopods, or to the *acetabulifera* of D'Orbigny, from the arms being provided with sucking disks. It differs from the true nautilus in the arms of larger size and more complicated structure, partially connected by membrane at the base; in the larger and more complex eyes, not pedunculated but lodged in orbits; in the gills being only two in number, each with a branchial heart; in the funnel being an entire tube; and in the presence of an ink gland and bag for its secretion. In the genus *argonauta* (Linn.), in the females, which alone have a shell as an egg receptacle, the first or dorsal pair of the eight arms are dilated into broad thin membranes, which secrete and sustain the very light, paper-like, calcareous, symmetrical, and single-chambered shell; like the other arms, these are provided with two rows of suckorial disks, extending around the whole circumference, by means of which the animal retains the shell in position; the six non-palmated arms serve as organs of prehension and locomotion, as the animal drags itself along the bottom or climbs the rocks in search of food, and as anchors; the shell, as in the nautilus, is carried above the body. The arms are attached to the anterior part of the cephalic cartilage; the suckers are completely under the control of the animal, which can fasten or relax them instantly. Swimming is effected in a retrograde manner by the ejected currents from the funnel. The skin is soft and tender, and includes a great number of cells containing pigment matter of different colors, whose contractions and expansions, with the surface movements, give it a remarkable power of rapidly changing its tints. There is no internal shell, and it is now ascertained that the external shell is peculiar to the female, and is only an incubating and protective nest for the eggs; it is not the homologue of the internal rudimentary shell of the cuttle fish, nor of the external chambered shell of the nautilus, but rather answers to the cocoon of leeches and other articulate, or to the egg-float of the delicate gasteropod *janthina*; the eggs are attached by thread-like stalks to the involuted

ments which determined that the argonaut is the maker of its own shell, and not a parasitic occupant like the hermit crab; this question arose from the fact that the animal has no muscular or other attachment to the shell, and has been known voluntarily to quit it, and survive in captivity a considerable time without any attempt to return to it; it also repairs the shell when broken by the agency of the palmated arms. For an account of the arguments for and against parasitism (among the advocates of the former being Lamarck, Leach, De Blainville, Broderip, and Sowerby, and among those of the latter Cuvier, Duvernoy, Férussac, and D'Orbigny), and for an extensive bibliography on this animal, see "Proceedings of the Boston Society of Natural History," vol. v., pp. 369-'81 (1856). Leach, who considered the animal a parasite, described it as the genus *oocythoë*. The sexes are distinct; the specimens usually found are all females, the males having been until recently described as parasites under the name of *hectocotylus*; this is a worm-like body, resembling the arm of a cuttle fish, the under surface bordered with 40 or 50 pairs of alternating suckers; for a long time regarded as a parasitic annelid, it is now known to be the spermatophorous arm of the male argonaut, deciduous during sexual congress, and attaching itself within the mantle of the female; in this genus it is the third arm of the left side which is thus deciduous and hollowed for the spermatoc receptacle. The male argonaut has no shell and no palmated arms, and is only about one eighth of the size of the female. The argonaut, according to Rang, rises to the surface shell upward, turning it downward when it floats on the water; by retracting the six arms within the shell and placing the palmated ones on the outside, it can quickly sink, explaining why the animal is so rarely taken with the shell. The shell is flexible in the water, but very fragile when dry; after having been soaked in water for some time it may be bent as before. A specimen, one of the largest known, in the cabinet of the Boston society of natural history, is 10 in. long, 6½ broad, and the opening 4 in. wide; it cost the donor \$500. Many species are described.

NAUVOO, a township of Hancock co., Illinois, on a bend of the Mississippi river, near the head of the lower rapids, 52 m. above Quincy and 220 m. above St. Louis; pop. in 1870, 1,578. The city of Nauvoo was founded by the Mormons in 1840, and contained about 15,000 inhabitants at the time of their expulsion in 1846 by the neighboring people. It was regularly laid out with broad streets crossing at right angles, and the houses were built generally of logs, with a few frame and brick buildings interspersed. A temple 130 ft. long by 90 wide was erected of polished limestone. The baptistery was in the basement, and held a large stone basin supported by 12 colossal oxen. In 1848 this building was set on fire by an incendiary, and all destroyed except the



Paper Nautilus (*Argonauta argo*).

spire of the shell, behind and beneath the body of the female. The best known species, the *A. argo* (Linn.), inhabits the Atlantic, Pacific, and Indian oceans, and the Mediterranean, especially about Sicily. In the last named locality Mme. Jeanette Power made the experi-

walls, which on May 27, 1850, were overthrown by a tornado. In 1850 Nauvoo was occupied by M. Cabet, a French communist, with a small body of followers, called Icarians; he died in 1856, and his community was broken up in the following year. Two weekly newspapers (one German) are published.

NAVAJOS, the most northerly band of the Apache Indians, inhabiting the table lands and mountains of a district on the San Juan and Little Colorado, called by the Spaniards Navajoa, whence they were styled Apaches de Navajoa. They call themselves Yutahenne. They are by far the most civilized tribe of the Athabascan stock, having evidently acquired many arts from the semi-civilized Indians of New Mexico. They cultivate the soil rudely but extensively, Col. Baker in 1859 estimating their farms at 20,000 acres; and having at an early period obtained horses, cattle, sheep, and goats, they soon had large herds and flocks, and learned to spin and weave cotton and wool. Their blankets are highly prized, bringing from \$80 to \$150. Their houses however are very rude, being merely conical structures of poles, covered with branches. Like all the Apaches, they have warred on the Mexicans from an early period. When they came within the limits of the United States they occupied Sevolleta and nine other fixed towns, all under one head chief. The Mexicans frequently attempted to reduce them. Doniphan's expedition in 1846, Wilkes's in 1847, Newby's in 1848, and Washington's in 1849 were failures. Sumner in 1851 pushed into the heart of their country, and planted Fort Defiance at Cañoncito Bonito, but was forced to retreat. A series of treaties were broken as soon as made; and the Navajos kept on killing and plundering till Col. Carson in 1863, in a winter campaign, conquered and compelled them to leave their country and remove to Bosque Redondo, on Pecos river, at a distance from their fastnesses. Here they were held as prisoners by government to the number of 7,000 for several years, at great expense. But they were constantly exposed to attacks from the Comanches and other hostile tribes; the site was unhealthy, the soil poor, and the water bad. On June 1, 1868, Gen. Sherman and Col. Tappan as commissioners concluded a treaty, and the next month the Navajos were removed to Fort Wingate, and in 1869 to their old country around Fort Defiance, 6,120 square miles being assigned as their reservation. One band, Sandoval's, has been friendly from the first. In 1872 the Navajos on the reservation numbered 9,114, with three outlying bands. They had 130,000 sheep and goats, 10,000 horses, and some cattle. They were peaceful and well disposed, and received \$91,000 a year in annuities. In 1870 a Presbyterian mission and school were established, but the school soon ceased. The Navajos are distinguished by a full round eye. They dress decently, covering the whole body, in textures of their own weaving, generally of

bright colors; and the warriors wear a helmet-shaped deerskin cap with feathers. Their arms are bows, lances, and rawhide shields.

NAVARINO, or *Neocastro*, a fortified town of the Morea, Greece, in the nomarchy of Messenia, at the S. extremity of the bay of Navarino, 5 m. N. of Modon (Methone), and 3 m. from Old Navarino, which stands on the N. coast of the bay, near the ruins of Messenian Pylos; pop. about 2,000. It has a citadel, situated on a high rock. The chief objects of interest are the remains of an old aqueduct, and some antique marble pillars adorning the front of a former mosque. The bay of Navarino is about 3 m. long and 2 m. wide, with from 12 to 26 fathoms of water. It is shut in by the island of Sphacteria or Sphagia, famous for the victory achieved there by the Athenian Cleon over the Spartans, 425 B. C. Here, on Oct. 20, 1827, the combined fleets of Great Britain, France, and Russia, under Codrington, Rigny, and Heiden, destroyed the Turkish-Egyptian fleet, which greatly promoted the success of the Greeks in their struggle for independence.

NAVARRÉ (Span. *Navarra*), a N. province of Spain, between Aragon, Old Castile, and Biscay, bounded N. by France and the Pyrenees, E. by the provinces of Huesca and Saragossa, S. by Saragossa and Logroño, and W. by Álava and Guipúzcoa; area, 4,045 sq. m.; pop. in 1870, 318,687. The country generally is intersected by small mountain ranges projecting southward from the Pyrenees; but near the banks of the Ebro, which forms a part of the southern frontier, there are wide and fertile plains. Besides that river, Navarre is watered by its affluent the Aragon, which, coming from the northeast, receives several smaller streams, running due S. from the mountains; in the southwest by the Ega, another affluent of the Ebro; and toward the northwest by the Bidassoa, which falls into the bay of Biscay. While the mountainous region is mostly bleak, cold, and unsuitable for tillage, the valleys are fertile in wheat, maize, barley, and oats. Hemp, flax, oil, wine, and liquorice are also produced; it is principally a grazing and agricultural district, and manufactures are in a very backward state. The canal of Aragon, which connects Tudela and Saragossa, affords means of intercourse with the adjoining provinces on the east, and the province is also connected by railways W. and S. with the principal cities in Spain. It communicates with France by railway N. to Bayonne, and by roads through mountain passes or defiles, the most celebrated of which is that of Roncesvalles, where the army of Charlemagne was defeated. In the mountains, besides the Pyrenean limestone, jasper, slate, and marble occur in large beds; there are iron, copper, and lead mines, numerous thermal springs, salt springs, and mines of rock salt. The forest trees of the Pyrenees, chiefly consisting of pines, beeches, oaks, and chestnuts, furnish an

abundant supply of building timber. Wolves, wild boars, foxes, and wild cats are found in the mountains. The principal occupation of the people is pasturing sheep, goats, and cattle. Wool, grain, hides, salt, and wine are the chief exports, and silk and cotton fabrics and colonial produce the most important imports. The Navarrese are tall and well formed, and evince an independent spirit and great attachment to their religion and ancient privileges. The Castilian language is generally used among them; but the Basque is spoken in the N. W. and W. districts. The principal towns are Pamplona, the capital, Tudela, Estella, and Tafalla.—This province, which is sometimes termed Upper Navarre, once formed a kingdom, in conjunction with Lower Navarre, which is situated on the northern slope of the Pyrenees, within the limits of France. It was one of the first Christian principalities founded after the conquest of Spain by the Arabs, and, although occasionally overrun by those invaders, was never subdued. It acknowledged for a while the supremacy of Charlemagne and his immediate successor, Louis le Débonnaire; but about the middle of the 9th century it vindicated its independence, which was sanctioned in 887 by the diet of Trebur. At the beginning of the 11th century, under Sancho III., surnamed the Great, its limits were considerably enlarged; and it was for a while the most powerful among the Christian kingdoms of Spain. In 1234 it fell by inheritance to Thibault, count of Champagne, whose granddaughter Jeanne in 1284 married the future Philip the Fair of France; and on the accession of that prince to the throne in the following year, Navarre was united to France. This union lasted 43 years; and on the accession of Philip VI. of Valois, Navarre returned to its own sovereigns. Jeanne, the daughter of Louis X. of France, the lawful heirless, brought the Navarrese crown to the house of Évreux, from which, by intermarriage, it passed in succession to the houses of Aragon in 1425, of Foix in 1479, and finally of Albret in 1494. The whole of Spanish Navarre was in 1512 seized by Ferdinand the Catholic, king of Aragon; and henceforth the kingdom was limited to the small district known as French or Lower Navarre. By the marriage of Duke Antoine to Jeanne d'Albret Navarre was acquired by the house of Bourbon, and their son Henry of Navarre, in 1589, inherited the throne of France. His successors, until 1830, styled themselves kings of France and Navarre. During the Carlist struggles in 1834-'9 and in 1872-'5 the province was a principal seat of war, it being mainly occupied by the Carlists. Estella, their chief stronghold, was captured by the Alfonsists in February, 1875.

NAVARRETE, Domingo Fernandez, a Spanish missionary, born at Peñaflor in 1610, died in Santo Domingo in December, 1689. He joined the Dominican order, and in 1647 was sent to the Philippine islands, and became professor of theology at Manila. Visiting China, he

penetrated into the interior of the empire, and was for some years superior of his order there; but during a persecution he was apprehended and sent to Canton, whence he escaped to Macao, took ship for Europe, and reached home in 1673. In the same year he went to Rome, and protested to the pope against the policy of the Jesuit missionaries in China, whom he accused of accommodating themselves to the ceremonies of the natives. In 1678 he was appointed archbishop of Santo Domingo. He published *Tratados históricos, políticos, éticos y religiosos de la monarquía de China* (fol., Madrid, 1676). A second volume of this work was suppressed by the inquisition, and a third was written but never printed.

NAVARRETE, Juan Fernandez, surnamed EL MUDO (the Mute), a Spanish artist, born in Logroño in 1526, died about 1575. He became deaf and dumb in his infancy, studied painting in the monastery of the Hieronymites at Estrella, and afterward in Italy, and was a pupil of Titian. He devoted himself to sacred subjects, and nearly all his works are in the Escorial.

NAVARRETE, Martino Fernandez, a Spanish historian, born at Abalos, Old Castile, Nov. 9, 1765, died in Madrid, Oct. 8, 1844. He entered the navy in 1780, was present at the attack on Gibraltar in September, 1782, and afterward served against the Moors and Algerines. In 1789 he was commissioned by the Spanish government to compile from the national archives a collection of documents on the history of Spanish maritime discovery. He returned to sea when war was declared with France, and remained afloat until he was appointed in 1797 to a post in the ministry of marine. On the French invasion in 1808 he retired to Seville. Returning to Madrid in 1814, he engaged in literary labors, proposed the new system of orthography adopted by the Spanish academy in its dictionary, and wrote a "Life of Cervantes" (Madrid, 1819). In 1823 he was made chief of the hydrographical department. The first two volumes of the work to which he devoted the best part of his life were published at Madrid in 1825, under the title of *Coleccion de los viajes y descubrimientos que hicieron por mar los Españoles desde fines del siglo XV*. The third appeared in 1829, and the fourth and fifth in 1837. The sixth and seventh were left unfinished at the author's death. The first two volumes are devoted to the discoveries of Columbus, concerning whom they brought to light from the national archives an immense wealth of information, consisting of letters, public documents, &c., which were the basis of Washington Irving's "Life of Columbus." Navarrete began in 1842, with two associates, a "Collection of Unpublished Documents for the History of Spain," of which five volumes appeared during his lifetime, and it was continued after his death. He published a treatise on the Spanish discoveries on the Pacific coast of North America, prefixed to a narrative of

the "Voyage of the Sutil and Mexican on the Coasts of California" (1802). His *Disertacion sobre la historia de la nautica española* was published in 1846, and his *Biblioteca maritima española*, in 2 vols., in 1851.

NAVARRO, a N. E. county of Texas, bounded N. E. by the Trinity river, by branches of which it is drained; area, 1,040 sq. m.; pop. in 1870, 8,879, of whom 2,245 were colored. It has a rolling surface, with a rich, dark soil along the watercourses, and a large portion of prairie. It is traversed by the Houston and Texas Central railroad. The chief productions in 1870 were 219,865 bushels of Indian corn, 5,150 of sweet potatoes, 4,077 bales of cotton, and 2,935 lbs. of wool. There were 9,244 horses, 1,151 mules and asses, 4,875 milch cows, 2,459 working oxen, 32,783 other cattle, 7,144 sheep, and 16,419 swine. Capital, Corsicana.

NAVEZ, François Joseph, a Belgian painter, born in Charleroi, Nov. 17, 1787, died in Brussels in 1869. He studied at Brussels, won a prize at Ghent, became a pupil of J. L. David in Paris, and subsequently visited Italy. On returning to Brussels he rapidly rose to be the most eminent master of the academical school of painting, and became director of the academy of fine arts and professor in the normal school. Among his works are: "Hagar in the Desert," "Meeting of Isaac and Rebecca," "Raising of the Son of the Samaritan Woman," "The Prophet Samuel," "The Ascension of the Virgin," "Marriage of the Virgin," "Jesus Sleeping," and "The Virgin and the Infant Jesus."

NAVIGATION, the art or system of rules and practices by means of which vessels are directed in their course upon the water. Prior to the invention of the mariner's compass navigation was limited to enclosed seas like the Mediterranean, to gulfs and archipelagos, and to the coasts. Beyond the sight of land, the mariner had no guide in cloudy nights, and no resource in stormy weather; consequently, the most remote and venturesome expeditions only moved along the shore; and the sea was avoided as much as possible, especially during the winter season, from the middle of November to the middle of March. The discovery of the mariner's compass changed this state of things entirely, by furnishing a never-failing guide, as useful and safe to the navigator in the night as during the day, and in storms as in fair weather. It is uncertain to whom the world is indebted for the first observation of the directing powers of the magnet, and for their application to the purposes of travelling by land and sea. (See COMPASS.) The introduction to Churchill's "Collection" contends for the honor of the discovery in behalf of Flavio Gioja of Pisanò, near Amalfi, in Campania. The date assigned to Gioja's invention is about the beginning of the 14th century. There can be no doubt that to him belongs the merit of having invented something by which its adaptation to nautical purposes was very much promoted;

but that it was used at sea before his time appears from various passages in authors of an older date. It was known in China many centuries previous to its introduction into Europe, and was used in the eastern portion of the Mediterranean during the first half of the 13th century.—When ships, carrying with them an unfailing guide to direct their course, began to traverse the great seas in all directions, the cross staff and the astrolabe furnished them with the means of measuring the altitude of the sun and stars, and thus of approximately determining the latitude and time. But the most serious inconvenience arose from the unavoidable use of a plane chart to represent the sphere, the gross distortions and errors of which often misled the mariner, especially in voyages far distant from the equator. Recourse was had to globes to remove this evil, and a famous pair is mentioned which was made in 1592, under the direction of Mr. William Sanderson, a merchant, "commended for his knowledge as well as generosity to ingenious men." On the terrestrial one were described the voyages of Drake, Cavendish, and Frobisher. The plane chart, however, being so much more easy and convenient in practice, kept its place until the invention of the projection of the sphere upon a plane surface by Gerard Mercator, in 1569. Mercator's projection consists in keeping the meridians parallel, but augmenting the length of the meridians between the parallels of latitude, in receding from the equator, in such a manner that the just proportions of the meridians and parallels of latitude to each other are preserved. The signal advantage of this projection is, that the directions of the compass, or what in technical language are called the "compass courses," are straight lines. The navigator works most conveniently upon a plane surface, and by means of Mercator's projection he is able to lay down his courses with a parallel rule, the points being taken from a compass drawn on the chart, and the line being one that cuts all the meridians at the same angle, and marks the magnetic bearing of the objects through which it passes. This is called the rhumb line or loxodromic curve, and the definition of it answers for the definition of the compass course. Such is the suitability of Mercator's projection to the use of the mariner's compass, that the latter now seems to have been an incomplete discovery until the announcement of the former. It is suggested that Mercator arrived at his invention by simply observing on the globe where the meridians were cut at each parallel of latitude by the rhumb lines; and it is admitted that he never laid down, if he knew it, the mathematical theory on which it rests. This was first announced by Edward Wright, of Caius college, Cambridge. Shortly after this (1595), the famous navigator Capt. John Davis, who gave his name to the straits which he discovered, published a small treatise called "The Seaman's Secrets," at the end of which he gives a figure of a staff of his contrivance,

to make a back observation; "than which instrument," he said, "the seaman shall not find any so good, and in all climates of so great certaintie." The celebrated Portuguese mathematician Pedro Nunez, or Nonius, had as early as 1537 published his book, which, with additions, was printed 30 years afterward by Basil in Latin, and called *De Arte et Ratione Navigandi*. In this he introduces, among much of what was then very valuable matter, his method of the division of a quadrant by concentric circles. Davis's back staff maintained the first place until it was superseded by the quadrant. Another important invention is the log, first mentioned by Pigafetta in the early part of the 16th century. About the year 1620 logarithms were introduced into navigation by Edmund Gunter, whose scales are of such general repute; and shortly afterward Richard Norwood published his method of setting down and perfecting a sea reckoning, with the use of a traverse table. In 1700 Dr. Halley published a general map on which were delineated the lines of equal variation. It was hailed with great applause, as the means of determining the longitude at sea; but this expectation proved futile. But of all the gifts to the navigator, by far the greatest of this time is Hadley's quadrant. It has been superseded by the sextant, which does not differ from it in principle, but is very much more nicely constructed, and more accurate, convenient, and generally useful. (See QUADRANT, and SEXTANT.) For a long time the problem of the longitude engaged the attention of the men of science in Europe, and especially in Great Britain. The British house of commons has at various times offered rewards for the solution of this problem, one of which amounted to £20,000 sterling. Newton's improvement of the theory of the moon led to the construction of Mayer's lunar tables, and to the publication of the "Nautical Almanac and Astronomical Ephemeris," by Dr. Maskelyne, in 1767. The appearance of the latter created a new era in navigation, to which it rendered essential service. The lunar method, as it is called, has since received great additions, corresponding to the advancing state of astronomical knowledge, and the improvements in the instruments of the seaman and the astronomer. The method by the chronometer owes its highest success to the science and ingenuity of English artists and mechanics of the present generation, and that immediately preceding. (See CLOCKS AND WATCHES, and LONGITUDE.) In our day the art or science of navigation has not failed to receive valuable accessions; such as Sumner's method for determining the position by lines of bearing or of equal altitudes; Chauvenet's great circle protractor, which furnishes great circle courses immediately by inspection, saving a world of figures, and also solves in the same way the problems of nautical astronomy; precise and trustworthy sailing directions and memoirs, like those of Horsburgh,

the Blunts of New York, Findlay, and the invaluable memoirs of Kerhallet; and valuable contributions to our knowledge of the laws of storms by Redfield, Reid, and Piddington, and of the currents and meteorology of the ocean generally by Berghaus, Keith Johnston, and Maury.—Without attempting a scientific treatise on navigation, we may give the general reader a simple conception of the manner in which the place of a ship and her direction are ascertained upon the sea, under favorable circumstances. When the ship has left port, the reckoning is begun by observing the compass bearing and distance of some conspicuous object, as a lighthouse; and from the time of taking this bearing the reckoning is continued by noting down (generally from hour to hour) the courses sailed, which are ascertained by observations of the compass, and the distance on each course, which is ascertained by the log. (See LOG.) The reckoning is made up with these data, from the time of any independent determination of the ship's position, by considering the sum of the distances sailed in the N. and S. and E. and W. directions, and reducing the whole to one residual expression of the actual course and distance made good; this is done by means of a traverse table invented for the purpose. The reckoning here described is called dead reckoning, and is susceptible of error from so many disturbing causes, that it can only be depended upon for a short time. The navigator is provided with simple and easy methods of acquiring a knowledge of his position by independent observations of the sun, moon, and stars. We will look only at the first of these luminaries. The elements of position are the latitude and longitude. The determination of the latitude by the altitude of the sun at noon is readily understood, if it be remembered that if the sun moved always on the equator, the height it reached at noon at any place would depend merely on the distance of that place from the equator; but the sun being removed from the equator more or less, according to the season of the year, the navigator reduces it to that circle by applying the declination, which is the astronomical expression in degrees and minutes for the interval of its separation. For this declination and all his astronomical data, he is indebted to the nautical almanac. The longitude is determined by chronometers. A chronometer is expected to keep the time of a certain place, as Greenwich or Paris; but as all chronometers are subject to a slight rate of loss or gain, this rate, and the error at starting, are applied at the moment of observation, to obtain the correct Greenwich time. The change of a degree in longitude is equivalent to a change of four minutes in time; the business of a navigator then is simply to compare his own time with the standard time, or the time at Greenwich; he obtains his own time through an observation of the sun when its altitude is changing rapidly. In the case of the

determination of the longitude by the lunar method, the clock showing the Greenwich time is in the sky. Such observations are detached and disconnected. The navigator, if set down suddenly in the middle of the ocean, could determine his position as well as if he had proceeded there gradually, and known it from day to day.—We have selected single and plain cases only; but navigation, regarded as an art, is a copious and complex system of rules and practices, involving the use of numerous tables. Bowditch's "American Navigator" is a large octavo of nearly 800 pages, containing over 50 tables. Raper's "British Standard Navigator" (edition of 1849), approved by the admiralty, numbers 900 pages and 74 tables. Navigation, regarded as a science, requires at the very least a knowledge of spherical trigonometry and algebra in the mathematics, and of the apparent motions and phenomena of the principal heavenly bodies in astronomy. In addition to the above named authorities, see Peirce's "Plane and Spherical Trigonometry;" Chauvenet's "Trigonometry" and "Manual of Astronomy;" Francœur's *Astronomie pratique*; Boitard and Ansard-Deusy's *Navigations pratique*; Churchill's "Collection," introductory discourse; Dr. Wilson's "Dissertation," in Robertson's "Elements;" and Humboldt's "Cosmos." (See SHIP.)

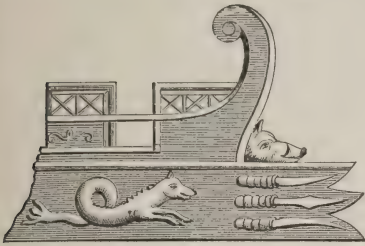
NAVIGATION LAWS, the name usually given to those enactments by which commercial states have endeavored to regulate the navigation which left or visited their ports, seeking always to favor and promote the commerce of the state enacting them. Such laws have existed in some form among all the maritime states of Europe for many centuries. The first systematic effort of this kind was probably that of Spain, about three centuries ago, to preserve the exclusive possession of her very profitable commerce with her American colonies. In England, so far back as 1379, in the reign of Richard II., a statute was passed prohibiting the king's subjects from importing or exporting merchandise except in English ships. After this time sundry enactments were passed for a similar purpose. But the navigation laws of England, so called, properly began in Cromwell's time. Then the long pending conflict between Holland and England for the supremacy of the seas came to a crisis. The contest continued after the restoration of Charles II. But the fatal blow was given to Holland, and the superiority of England made certain, not so much by her naval victories as by the navigation laws, which, originating in the sagacity of Cromwell, and receiving then the form they have preserved until recent times, secured to England, first, the building of all her ships and their navigation by English seamen; next, the absolute monopoly of her colonial commerce; and finally, her full share of the general carrying trade of the world. For these purposes it was provided that no ship should be deemed a British ship that was not wholly built within

the dominions of Great Britain, and wholly owned by British subjects, and navigated by a British commander and a crew of which at least three fourths were British subjects; next, that only British ships should carry any merchandise from any port of the British empire to any other; and thirdly, that no goods which were the growth, product, or manufacture of Asia, Africa, or America, should be imported into any of the ports of Great Britain except in British ships, or in ships of the countries of which the goods were the production. The rigorous execution of these laws, and the consistent adherence to these principles, are supposed by many to have done more than any other one cause in giving to Great Britain her enormous commerce. In order to ascertain what were British ships, and secure the execution of these laws, an admirable system of registry was adopted and remained in force in England during almost two centuries, with no substantial change. But in 1849 the principle of free trade was permitted to break down this monopoly to some extent. By the act of that year and the subsequent amendments it is enacted, first, that ships which are not of British build may become British ships by registry, if wholly owned by British subjects; and next, that any ship may bring to the United Kingdom any merchandise, excepting, however, that the king or queen, by order in council, may interpose such changes, restrictions, or prohibitions upon ships of any country as will put the ships of that country when in British ports on the same footing on which British ships stand in the ports of that country. —This subject was one of the earliest to which the American congress, under the present constitution, turned its attention; and in the winter of 1792-'3 acts were passed which were substantially the same as the English acts then in force, but, so far as they differ, may be considered as more rigorous. These statutes are still in force, having never been materially altered. The maritime nations of continental Europe have their own systems of navigation laws, but these are not in any case quite so stringent as those of England and the United States. During the years which immediately followed the adoption of the federal constitution, England and France being constantly at war, the United States had almost the whole carrying trade of the world; and its vast profits laid the foundation of the wealth of the country, and built up its commercial marine with a rapidity unexampled in the history of the world.

NAVIGATORS' ISLANDS. See SAMOAN ISLANDS.

NAVY, a collective term for the vessels of war belonging to a nation. The sea-going vessels of Phœnicia and Carthage, of Greece and Rome, were flat-bottomed barges or galleys, unable to live in a gale; sea room in a squall was destruction to them; they crept along the coasts, casting anchor at night in some cove or creek. (See GALLEY.) To cross over from Greece to

Italy, or from Africa to Sicily, was a dangerous operation. The ships were provided with but



Prow of a Galley.

little canvas, and oars were relied upon to propel them sluggishly. The implements for offensive warfare were equally inefficient. Bows and arrows, javelins, clumsy ballistas and catapults, were the only arms that could be used at a distance. No serious harm could be done to an enemy at sea until the two fighting ships came into actual contact. Thus, there were but two modes of naval fighting possible: to manœuvre so that the sharp, strong, iron-pointed prow of your own ship should be driven with full force against the enemy's broadside in order to run him down; or else to run on broadside to broadside, fasten the two ships together, and board the enemy at once. After the first Punic

minion soon put an end to the possibility of further naval contests in the Mediterranean.

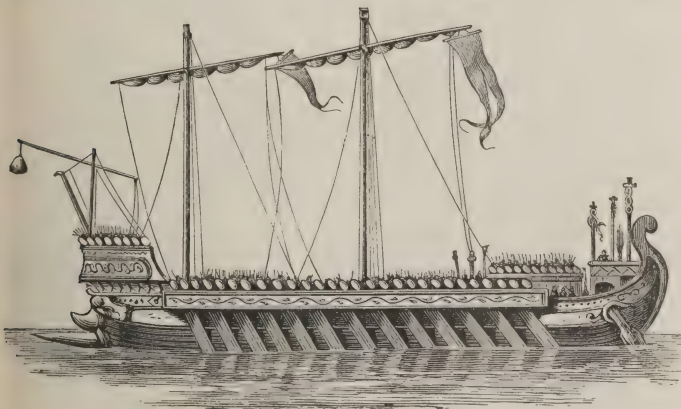
—In the naval encounters between the Romans and Gauls described by Cæsar, the former used galleys and the latter merely sail vessels, from which fact it would seem that in the seas about Great Britain sail vessels only were used at that time. The invasion of England by the Anglo-Saxons was made in sail vessels. In the time of Alfred galleys were introduced, the effect of which was to diminish the length and boldness of voyages, for the galleys could not venture out to sea, although they made excellent coast guards. After the Norman conquest sail vessels came more into use, and voyages again became bolder. But the real birthplace of our modern navies is the German ocean. About the time when the great mass of the Teutonic tribes of central Europe rose to trample down the decaying



Norman Galley.

Roman empire and to regenerate western Europe, the Frisians, Saxons, Angles, Danes, and Northmen began to take to the sea. Their

vessels were firm, stout sea boats, with a prominent keel and sharp lines, relying mostly on sails alone, and not afraid to face a gale in the middle of that rough northern sea. It was with this class of vessels that the Northmen undertook their roving expeditions, extending to Constantinople on the one side and America on the other. The vessels in which the Northmen made their excursions were probably of no very large size, perhaps not exceeding 100 tons in any case, and car-



Roman Galley.

war, which destroyed the naval superiority of the Carthaginians, there is not a single naval engagement in ancient history offering the slightest professional interest, and Roman do-

rying one or at the outside two masts, fore-and-aft rigged. For a long time both ship building and navigation appear to have remained stationary; during the whole of the

middle ages vessels were small, and the bold spirit of the Northmen and the Frisians had passed away; whatever improvements were made were owing to Italians and Portuguese,

—The foundation of the British navy was laid by Henry VII., who built the first ship, called "The Great Harry." His successor formed a regular standing fleet, the property of the state,



Henry Grace de Dieu, from an old woodcut.

who now became the boldest sailors. The Portuguese discovered the route by sea to India; two Italians in foreign service, Columbus and Cabot, were the first since the times of Leif the Northman to cross the Atlantic. Long sea voyages now became a necessity, and they required large ships; at the same time the necessity of arming vessels of war, and even merchantmen, with heavy artillery, equally tended to increase size and tonnage. The same causes which had produced standing armies on land, now produced standing navies afloat; and it is from this time only that we can properly speak of navies. The era of colonial enterprise which now opened for all seafaring nations, also saw the formation of large fleets of war to protect the newly formed colonies and their trade; and a period followed richer in naval struggles and more fruitful to the development of naval armaments than any that preceded it.

the largest ship of which was called the Henry Grace de Dieu. This vessel, the largest ever built up to that time, carried 80 guns, partly on two regular flush gun decks, partly on additional platforms both forward and astern. She was provided with four masts; her tonnage is variously stated at from 1,000 to 1,500. The whole of the British fleet at the death of Henry VIII. consisted of about 50 sail, with an aggregate tonnage of 12,000, and manned by 8,000 sailors and marines. In 1578 it comprised 24 ships, of 10,395 tons, 954 guns, and 6,570 men. The Triumph, of 1,000 tons and 100 guns, was the largest vessel; next to her ranked the Elizabeth and the White Bear, each of 900 tons and 80 guns. The large ships of the period were clumsy contrivances, deep-waisted, that is to say, provided with towering forecastles and poops, which rendered them exceedingly top-heavy. The Mary Rose was sunk off Sheerness in 1588 while tacking, her lower ports being only 16 inches above the water. The first English three-decker was the Sovereign of the Seas, afterward called the Royal Sovereign, built in 1637. She bore the character of the best man-of-war in the world until 1696, when she was accidental-



The Sovereign of the Seas.

ly burned at Chatham. She is the first vessel of whose armament we get something like an accurate account. She had three flush decks, a forecastle, a half deck, a quarter deck, and a

round house; on her lower deck she carried 30 guns, 42- and 32-pounders; 30 on her middle deck, 18- and 9-pounders; on her upper deck 26 lighter guns, probably 6- and 3-pounders. Besides these, she carried 20 chase guns and 26 guns on her forecastle and half deck. But on her regular home establishment this armament was reduced to 100 guns, the full complement being evidently too much for her. As to the smaller vessels, our information is very scanty. In 1651 the navy was classed in six rates; but besides them there continued to exist numerous classes of unrated ships, such as shallops, hulks, and later bombs, sloops, fire ships, and yachts. In 1677 we find a list of the whole English navy; according to which, the largest first rate three-decker carried 26 42-pdrs., 28 24-pdrs., 28 9-pdrs., 14 6-pdrs., and 4 3-pdrs.; and the smallest two-decker (fifth rate) carried 18 18-pdrs., 8 6-pdrs., and 4 4-pdrs., or 30 guns in all. The whole fleet consisted of 129 vessels. In 1714 we find 198 vessels; in 1727, 178; and in 1744, 128. Afterward, as the number of vessels increases, their size also gets larger, and the heaviness of the armament is augmented with the tonnage. The first English ship answering to our modern frigate was built by Sir Robert Dudley, as early as the end of the 16th century; but it was not till fully 80 years later that this class of ships, first used by the southern European nations, was generally adopted in the British navy. The particular fast-sailing qualities of frigates were little understood for some time in England. British ships were generally over-gunned, so that their lower ports were but 3 ft. from the water's edge, and could not be opened in a rough sea, and the sailing capacities of the vessels were also greatly impaired. Both the Spaniards and the French allowed more tonnage in proportion to the number of guns; the consequence was that their ships could carry heavier calibre and more stores, had more buoyancy, and were better sailers. The English frigates of the first half of the 18th century carried as many as 44 guns, of 9, 12, and a few of 18 lbs. calibre, with a tonnage of about 710. By 1780 frigates of 38 guns (mostly 18-pdrs.) and of 946 tons were built. The French frigates of the same epoch, with a similar armament, averaged 100 tons more. About the same time (the middle of the 18th century) the smaller men-of-war were more accurately classed in the modern way as corvettes, brigs, brigantines, and schooners. In 1779 a piece of ordnance was invented (probably by the British Gen. Melville) which changed to a great extent the armaments of most navies. It was a very short gun, with a large calibre, approaching in its shape a howitzer, but intended to throw solid shot, with small charges, at short ranges. These guns were first manufactured by the Carron iron company, in Scotland, and were hence called carronades. The shot from this gun, useless at long ranges, had fearful effects upon timber at close quarters; from its

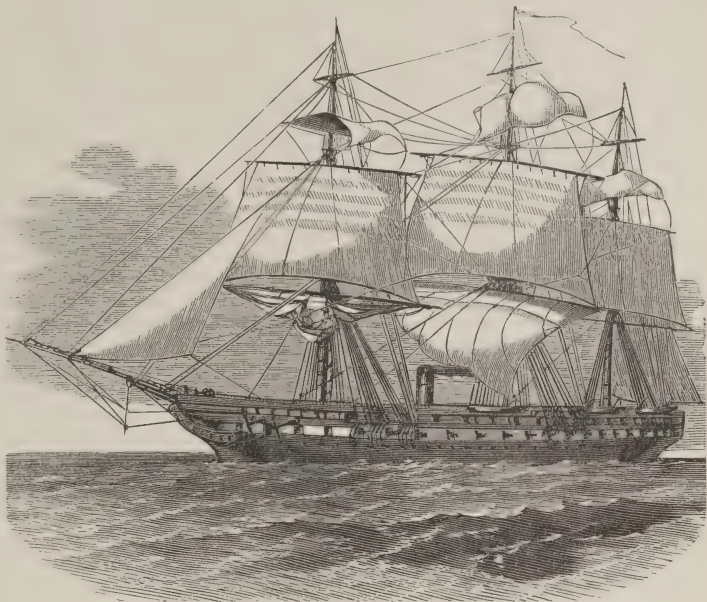
reduced velocity (by the reduced charge), it made a larger hole, shattered the timber far more, and made numerous and more dangerous splinters. The comparative lightness of the guns, too, made it easy to find room for a few of them on the quarter deck and forecastle of vessels; and as early as 1781 there were 429 ships in the British navy provided with from six to ten carronades over and above their regular complement of guns. In reading the accounts of naval engagements during the French and American wars, it should be borne in mind that the British never include the carronades in the number of guns given as a ship's complement; so that, for instance, a British frigate, stated to be a 36-gun frigate, may in reality have carried 42 or more guns, including the carronades. The superior weight of metal which the carronades gave to the British broadsides, helped to decide many an action fought at close quarters during the war of the French revolution. But after all, carronades were merely a make-shift to increase the strength of the comparatively small-sized men-of-war of a century ago. As soon as the size of the ships was increased for each rating, they were again cast aside, and are now superseded by other arms. At that period, in the construction of men-of-war, the French and Spaniards were decidedly ahead of the English. Their ships were larger and designed with far better lines than the British; their frigates especially were superior both in size and sailing qualities; and for many years the English frigates were copied from the French frigate Hebe, captured in 1782. In the same proportion as the vessels were lengthened, the high towering erections at the bow and stern, the forecastles, quarter decks, and poops, were reduced in height, the sailing qualities of the ships being increased thereby; so that gradually the comparatively elegant and swift-sailing lines of the present men-of-war came to be adopted. Instead of increasing the number of guns to these larger ships, the calibre was increased, and so were the weight and length of each gun, in order to admit of the use of full charges, and to secure the greatest point-blank range, so as to allow the fire to be opened at long distances. The small calibres below 24 lbs. disappeared from the larger vessels, and the remaining calibres were simplified, so as to have no more than two calibres, or at the outside three, on board of any one vessel. In ships of the line, the lower deck, being the strongest, was armed with guns of the same calibre as the upper decks, but of greater length and weight, in order to have at least one tier of guns available for the greatest possible range.—About 1820 the French Gen. Paixhans made an invention which has been of great importance in naval armaments. He constructed a gun of large calibre provided with a chamber at the breech for the insertion of the powder, and began to fire hollow shot, at low elevations, from these "shell guns" (*canons obusiers*). Hither-

to hollow shot had been fired against ships from howitzers in shore batteries only; though in Germany the practice of firing shell horizontally from short 24-pdr. and even 12-pdr. guns had been long in use against fortifications. The destructive effects of shell against the wooden sides of vessels were well known to Napoleon, who at Boulogne armed most of his gunboats for the expedition to England with howitzers, and laid it down as a rule that ships must be attacked with projectiles which will burst after hitting. Now, Paixhans's shell guns gave the means of arming ships with cannon which, by throwing their shells as nearly as possible horizontally, could be used at sea, ship against ship, with nearly the same probability of hitting as the old round-shot guns. The new gun was soon introduced into all navies, and, after undergoing various improvements, for some time constituted an essential portion of the armament of all large men-of-war.—The first attempts were made to apply steam to the propulsion of ships of war shortly after it had been applied by Fulton to that of commercial vessels. The progress from the river steamer to the coasting steamer, and gradually to the ocean steamer, was slow; in the same ratio was the progress of war steamers retarded. As long as paddle boats were the only steamers in existence, this was justifiable. The paddles and part of the engine were exposed to the enemy's shot, and could be disabled by a single lucky hit; they took up the best portion of the broadside room of the vessel; and the weight of engine, paddles, and coal so much reduced the capacity of the ship, that a heavy armament of numerous long guns was entirely out of the question. A paddle steamer, therefore, could never be a ship of the line; but its superior speed might permit it to compete with frigates, which are expected to hover on the flanks of an enemy, to collect the fruits of a victory, or to cover a retreat. Now a frigate has just the size and armament which enable it to go fearlessly on any independent roving errand, while its superior sailing qualities enable it to withdraw in time from an unequal contest. The sailing qualities of any frigate were far outstripped by the steamer; but without a good armament the steamer could not fulfil its mission. Regular broadside fighting was out of the question; the number of guns must, for want of space, be always inferior to that of a sailing frigate. The diminished number of guns on board a steam frigate was counterbalanced by their weight of metal and calibre. Originally these guns were intended to throw shells only, but now rifled guns have nearly superseded smooth-bores, and in a short time there will be no smooth-bores afloat in the navies of the great powers. Moreover, the reduced number of guns admits of traversing platforms and railways being laid down on the deck, by means of which all or most of the guns can be brought to bear in almost any direction; a provision by which the strength of a steam frigate for an attack is

nearly doubled, and a 20-gun steam frigate can bring at least as many guns into action as could a 40-gun sailing frigate with but 18 working guns for each single broadside. Thus the large modern steam frigate is a most formidable ship; the superior calibre and range of her guns, added to her velocity, enable her to cripple an opponent at a distance where no effective return of fire would have been possible to the sailing vessel; while the weight of her metal comes in with crushing power when it is to her advantage finally to force the fighting. For smaller vessels, corvettes, advice boats, and other light craft, not counting in a naval battle, but very useful throughout a campaign, steam was at once found of great advantage, and there were many such paddle boats constructed in most navies. It was the same with transport ships. Where landings were intended, steamers not only reduced the length of passage to a minimum, but permitted one to calculate to a moral certainty the time of arrival at any given place. The transport of bodies of troops was now made a matter of great simplicity, especially as every naval country had a large fleet of commercial steamers to fall back upon for transport vessels in case of necessity. It was on these considerations that the prince de Joinville, in his well known pamphlet, ventured to maintain that steam had altered the condition of naval warfare to such an extent as to render an invasion of England by France no longer an impossibility. Still, so long as the ships used for decisive action, the ships of the line, remained exclusively sailing vessels, the introduction of steam could work but little change in the conditions under which great naval battles were fought. The invention of the screw propeller was destined to supply the means of revolutionizing naval warfare entirely, and to transform all war fleets into steam fleets. It was fully 13 years after the invention of the screw before the first step in this direction was made. Finally in 1849 the French engineer Dupuy-Delôme constructed the first screw line-of-battle ship, the *Napoléon*, of 100 guns and 600 horse power. This ship was not intended to depend upon steam only; unlike the paddles, the screw allowed a ship to retain all the lines and rigging of a sailing vessel, and to be moved at will by steam alone, by sails alone, or by both combined. She could therefore always save her coal for emergencies by having recourse to her sails, and was thus far less dependent upon the proximity of coaling stations than the old paddle-wheel steamer. On this account, and because her steam power was too weak to give her the full speed of a paddle steamer, the *Napoléon* and other vessels of this class were called auxiliary steam vessels; since then, however, ships of war of the largest class have been constructed which have steam power enough to give them all the speed of which the screw propeller is capable. The success of the *Napoléon* soon caused screw

ships of war to be built both in France and England. The Russian war gave a new impulse to this radical change in naval construction; and when it was found that all strong-built ships of war could, without too much difficulty, be fitted with a screw and engines, the transformation of all navies into steam fleets became only a matter of time. No large naval power now thinks of constructing sailing vessels; all ships newly laid down are screw steamers, except the few paddle steamers which for certain purposes are still required.—The Crimean war called into existence two new naval constructions. The first of these is the steam gun boat or mortar boat, originally constructed by the English for the contemplated attack on Cronstadt; it is a small vessel drawing from 4 to 7 ft. of water, and armed with one or two heavy long-range guns or a heavy mortar; the former to be used in shallow and intricate waters generally, the latter in the bombardment from a long distance of fortified naval arsenals. The gun boats, when acting in concert with coast batteries, will strengthen the defence, and will also provide naval warfare with those light skirmishers which were hitherto wanting to it. The second innovation is the iron-sided, shot-proof floating batteries, first constructed by the French, for the attack of coast defences. The navies of the world are at present in an experimental state. For defence of harbors and coasts iron-clad ships are taking the place of wooden unarmed ships, and indeed the French and British and some other European nations have sent to sea iron-clad cruisers. Several American monitors also have been tested at sea, and some contend that they are suitable for cruising; but the success of ironclads has not been so far fully demonstrated. For an account of the history of such vessels, and of rifled naval guns, see IRON-CLAD SHIPS.—The vessels of war of which modern navies are composed are classed in various ratings, from first to sixth rates. The classification before the introduction of steam and iron-clad ships was the following: 1. Ships of the line were the largest men-of-war afloat, destined to form the line of battle in a general action, and to decide the struggle by the weight of metal thrown into the enemy's

ships. They were either three-deckers or two-deckers; that is to say, they had either three or two covered decks armed with guns. These decks were called the lower, middle, and main or upper deck. The upper deck, which was formerly covered in at the quarter deck and



U. S. Screw Ship of War Wabash (first rate).

forecastle only, was afterward covered in by a continuous open deck from stem to stern. This open deck, which was called the quarter deck and forecastle, also carried artillery, mostly carronades; so that in reality a two-decker carried three, and a three-decker four tiers of guns. The heaviest guns were of course placed on the lower deck; and the guns became lighter in proportion as the batteries were more elevated above the water. The calibre being generally the same, lightness was obtained by reducing the weight of the guns, in consequence of which those on the upper decks could only stand reduced charges, which implied that they could be used only at shorter ranges. The only exception to this rule was in the case of chase guns, which were placed at the bow and stern of a ship, and which, even if placed on the forecastle or quarter deck, were still as long and heavy as possible, being required to act at the longest ranges practicable. Thus, the bow and stern guns of English ships of the line were composed either of 8- or 10-inch shell guns, or of 56-pdr. (bore 7·7 in.) or 68-pdr. (bore 8·13 in.) solid-shot guns, one of which was placed on the forecastle on a traversing platform. There were in the English navy generally six stern and five bow guns to a first rate; the remaining armament of such a ship was as follows:

POSITION.	DESCRIPTION.	W'ght.	Length.	No.
		Cwt.	Ft. In.	
Lower deck.....	8-inch shell guns....	65	9 0	4
" ".....	32-pdr. guns.....	56	9 6	28
Middle deck.....	8-inch shell guns....	65	9 0	2
" ".....	32-pdr. guns.....	50	9 0	82
Upper deck.....	" ".....	42	8 0	34
Forecastle and /	" ".....	45	8 6	6
quarter deck }	" carronades	17	4 0	14
Total.....	.....	.....	.....	120

The armament of the smaller ratings of vessels of the line was arranged upon the same principle. For the sake of comparison, we also give that of a French first rate, viz.: lower deck, 32 long 30-lb. guns; middle deck, 4 80-lb. shell guns, and 30 short 30-lb. guns; upper deck, 34 30-lb. shell guns; forecastle and quarter deck, 4 30-lb. shell guns, and 16 30-lb. carronades; in all, 120 guns. The French 80-lb. shell gun has a larger bore than the 8-inch English gun by 0.8 inch; the 30-lb. shell gun and the 30-lb. gun have a slightly larger bore than the English 32-pdr., so that the advantage of weight of metal would lie with the French. The smallest ship of the line carried 72 guns; the largest frigate carried 61. 2. A frigate is a ship with only one covered deck carrying guns, and another open deck above it (forecastle and quarter deck), which is equally

platform at the bow. Frigates being mostly sent on detached service, where they were always likely to become engaged single-handed against hostile frigates sent on the same errand, it was a great point with most naval nations to make them as large and powerful as possible. In no class of vessels is the increase in size so remarkable as in this. The United States, requiring a cheap navy strong enough to enforce respect, were the first to see the great advantage to be drawn from a fleet of large frigates, each of them superior to any frigate which other nations could bring against it. The superiority of the American ship builders in producing swift vessels was also taken advantage of, and the last war against England (1812-'15) showed in many well-contested engagements what formidable antagonists these American frigates were. They were considered models of this class of vessels. The names frigate and corvette or sloop have been retained in the navies of the present day. 3. The next class of men-of-war was called corvettes. They had but one tier of guns, placed on an open deck; but the larger class was provided with a forecastle and quarter deck (not connected however by a continuous deck amidships), where they carried a few guns more. Such corvettes, therefore, almost corresponded to what a frigate was 100 years ago,

before the two elevated extremities of the vessel were connected by a flush deck. These corvettes were strong enough to carry the same calibre of guns as the larger vessels. They also carried three masts, all square-rigged. Corvettes are also called sloops of war. 4. Of smaller vessels, brigs and schooners carried from 20 guns to 6. They had but two masts, square-rigged in brigs, fore-and-aft rigged in schooners. The calibre of their guns was necessarily smaller than that of the larger ships, and did not generally exceed 18- or 24-pdrs., going down as low as 12- and 9-pdrs. Vessels of this small power of offence could not be sent where seri-



U. S. Sailing Frigate Constitution.

provided with guns. The armament, in the English service, was generally of 30 guns (either all shell guns or part shell guns and part long 32-pdrs.) on the gun deck, and 30 short 32-pdrs. on the forecastle and quarter deck, with a heavy pivot gun on a traversing

ous resistance was anticipated. In European waters they have been superseded by small steamers, and they could have been of actual service only on such coasts as those of South America, China, &c., where they had to meet powerless antagonists, and where they mere-

ly served to represent the flag of a powerful naval nation.—During the 17th century the noted naval commanders distinguished themselves as soldiers as well as sailors, and in many instances (notably that of Admiral Blake) it is certain that commanders of fleets and squadrons had no naval experience. The result was, that in ships of war there were two departments, the sailing and the fighting departments, the former in charge of the navigation of the ship, and the latter of its discipline and fighting. This arrangement did not last long, as it was soon seen that a ship more than any other thing should have but one head, responsible for everything. Therefore the commander of a ship of war is now responsible for its navigation as well as for its discipline and the state of its war material, and in fact is the only person on board to whom the higher authority looks for the proper care of the public property and the behavior of the ship in action. The grades of officers are nearly the same in all navies of the present day. Admirals, vice admirals, rear admirals, and commodores in general command fleets and squadrons and navy yards. Captains command large ships, and commanders smaller ones. Lieutenant commanders and lieutenants are the immediate assistants and subordinates of the ship commanders. Masters come next below lieutenants, and are equivalent to second lieutenants; after them come ensigns. Midshipmen are aspirants for the higher grades, and are usually educated at government naval schools before they are sent to sea in cruisers. The preceding are all line officers. Chaplains, paymasters, surgeons, and engineers are attached to all navies, and have rank assimilated to the grades given above, dependent upon length of service. These are staff officers. In some foreign navies each of the three grades of admirals is subdivided into three other grades, making nine in all, designated by the colors of their flags, which are red, white, or blue. Thus there may be an admiral of the white, or of the red, or of the blue, &c. The admiral's ship is recognized by his flag, which is square. In the United States navy its color is blue. Captains and other commanders of ships fly a pennant. Gunners, boatswains, quartermasters, cockswains, carpenters, sailmakers, machinists, armorers, &c., are called warrant or petty officers according to the style of their appointments, and are not in general in the line of promotion. Seamen, ordinary seamen, landsmen, and firemen are the privates, and do the work of navigating the ship, firing the engines and handling the guns. A war ship's company must have in it numerous persons whose duties are exceedingly various. Thus, there are secretaries, clerks, cooks for the officers, cooks for the men, nurses, coopers, tailors, bakers, stewards, musicians, painters, &c., besides the assistants to these functionaries, and servants. A guard of marines is attached to every ship of war, the members of which are armed as

infantry and do sentinel's duty. Their officers have the same grades as those of the army, and are assimilated in rank to those of the line of the navy. Their grades, however, are not dependent upon length of service.—The origin of the navy of the United States may be said to date from Oct. 13, 1775, when congress authorized the equipment of two cruisers mounting respectively 10 and 14 guns. Before the end of that year, 15 more vessels, of from 20 to 36 guns, were authorized. These vessels were built in the colonies of New England, and in New York, Pennsylvania, and Maryland. On Dec. 22, 1775, congress appointed a corps of naval officers, of whom Esek Hopkins was commander-in-chief, and John Paul Jones was a lieutenant. The affairs of the navy were at this time intrusted to the management of a "marine committee." In October, 1776, the navy consisted of 26 vessels, mounting 536 guns, and its services throughout the revolutionary war were most important. In 1778 several vessels of considerable force were built or purchased for the navy; among these was the celebrated *Alliance*, a frigate of 32 guns. The first vessel of war taken by an American cruiser in battle was the *Edward*, which was captured by the *Lexington*, Capt. John Barry, on April 17, 1777. On March 27, 1794, congress authorized the construction of six frigates, and it was fortunately decided that three of them should be of a very heavy class; the *Constitution* was one of these ships. This step laid the foundation of the present navy, the vessels of the revolution having been disposed of at the end of that contest, in 1783. Large whaleboats were fitted out by both sides during the war of the revolution, which were effective gunboats. They were about 40 ft. long, propelled by oars and sails, and carried two guns and a supply of small arms. Their crew numbered between 40 and 50 men. They went far out to sea, and severe fights took place between the boats of the rebels and loyalists. In 1798 the navy department was formally created, and Benjamin Stoddart appointed the first secretary. At this time, urged by the depredations of France upon our commerce, and warned by the conduct of the Barbary powers, congress authorized a considerable increase of the navy, which the president was empowered to use for defence against the French. In the quasi war with France which resulted, our naval successes were marked. Upon the accession to office of Mr. Jefferson in 1801, the navy was reduced. In the same year war was declared by Tripoli against the United States, and continued till 1805. The naval achievements of these four years gave a high character to the American service. In 1803 the "gunboat system" was inaugurated. In 1806 and 1807 the number of gunboats was rapidly increased, congress having authorized the construction of 257 of these vessels; but they were afterward found to be expensive and inefficient, and the system was soon abandoned.

During the war of 1812 the navy obtained a vast increase of reputation. The superior force of the frigates of 1794 was evinced in their almost uniform success in action with an enemy hitherto deemed invincible on the ocean. The policy of maintaining an efficient navy was now considered settled; and although, compared with the navies of other nations, that of the United States is very small, the aim has always been to keep pace with the improvements of the day, and to have none but the most efficient ships of their class in the service. The navy of the United States still possesses wooden sailing vessels, but it is not probable that any of them will ever go to sea again as cruisers, or in any other capacity, except as practice ships or on some peaceful service. The sailing navy may be considered as out of existence. In the navy of the United States the wooden war steamers were on Jan. 1, 1874, as follows:

RANK.	Num-ber.	AVERAGE.	
		Guns.	Tonnage.
First rates.....	5	45	3,000
Second rates.....	31	20	2,200
Third rates.....	24	8	800
Fourth rates.....	5*	4	400

The wooden sailing vessels at the same date were as follows:

RANK.	Num-ber.	AVERAGE.	
		Guns.	Tonnage.
Second rates.....	5	15	2,600
Third rates.....	10	20	1,500
Fourth rates.....	8	10	800
	4	2	600

There were also 48 iron-clad vessels and 26 tugs and other small vessels. Admiral Porter in his annual report, Nov. 6, 1874, says that though the ironclads fulfilled in the late civil war the specific purpose for which they were built, none of them can now compete with recently constructed foreign monitors; 20 of them have been condemned, and only 17 are serviceable. Of the wooden ships only 31 can properly be called vessels of war, and a thorough rebuilding of the navy is recommended, especially of monitors for coast defence. The personnel of the navy, and its annual pay when at sea, were on Jan. 1, 1874, as follows: 1 admiral, \$13,000; 1 vice admiral, \$9,000; 11 rear admirals, \$6,000; 25 commodores, \$5,000; 50 captains, \$4,500; 90 commanders, \$3,500; 132 lieutenant commanders, \$2,800 to \$3,000; 236 lieutenants, \$2,400 to \$2,600; 100 masters, \$1,800 to \$2,000; 35 ensigns, \$1,200 to \$1,400; 103 midshipmen, \$1,000; and 235 cadet midshipmen at the naval school, \$500. There were 150 medical officers of the various grades, 131 paymasters, 211 engineers, 42 cadet engineers, 22 chaplains, 12 professors of mathematics, 17 naval constructors and assistants, and 7 civil engineers. The warrant officers

* Three iron vessels.

were 58 boatswains, 64 gunners, 46 carpenters, 40 sailmakers, and 58 masters' mates. On the retired list there were 280 commissioned and warrant officers. In the marine corps there were 92 officers of all grades from brigadier general to second lieutenant on the active list, and 10 commissioned officers on the retired list. The navy is governed under the president by the secretary of the navy. In his department are eight bureaus which have charge of all the details of administration of the service. Each of these has for its head an officer of the navy of high rank, who serves for four years.

NAXOS, or **Naxia**, an island of Greece, and the largest of the Cyclades, in the Archipelago 5 m. E. of Paros; length about 20 m., greatest breadth 14 m.; area, about 150 sq. m.; pop. in 1870, 11,508; of the eparchy of Naxos, which includes Paros and several smaller islands, 20,582, all members of the Greek church, except about 400 Roman Catholics. The surface is diversified and picturesque; the plains and valleys are remarkable for their fertility. In the centre of the island is the mountain anciently called Drius, now Zia or Dia, 3,300 ft. high, from which 22 islands and the Asiatic continent are visible. The vine, olives, oranges, iron, marble, &c., are produced, and cheese, honey, and wax are among the principal exports. The wine of Naxos, called Bacchus wine, was celebrated. Naxos formerly furnished the bulk of the emery used in trade, the annual production amounting to 2,000 tons. The island contains about 40 villages. Naxos, the capital, is on the W. coast; pop. about 5,000. The streets are narrow, and the former ducal palace is in ruins, but the white houses present a cheerful appearance. It is the seat of a Greek bishop and a Roman Catholic archbishop, and has ten Greek and four Roman Catholic churches, a Lazarist, a Capuchin, and an Ursuline convent, and a custom house.—This island in antiquity was sometimes called Strongyle from its circular form, sometimes Dionysias from the prevalence there of the worship of Dionysus (Bacchus), and frequently Dia in honor of Zeus. It was inhabited in early times chiefly by Ionians from Attica. It was conquered by Pisistratus, and in 490 B. C. by the Persians. After the battle of Salamis it regained its independence, but nine years later became a dependency of Athens, and after many vicissitudes of the Roman and then the Byzantine empire. In A. D. 1207 it became the seat of a duchy, comprising several other islands, established by the Venetian Marco Sanudo. In 1566 the island was taken by the Turks, and under Selim II. was ruled by a Jew, Joseph Nasi (the Prince).

NAYLOR, James, an English religious enthusiast, born at Ardsley, Yorkshire, about 1616, died in Huntingdonshire in 1660. In 1642 he took up arms for the parliament. After the overthrow of the royalist party he became a follower of George Fox and an itinerant preacher. He fancied that he was inspired,

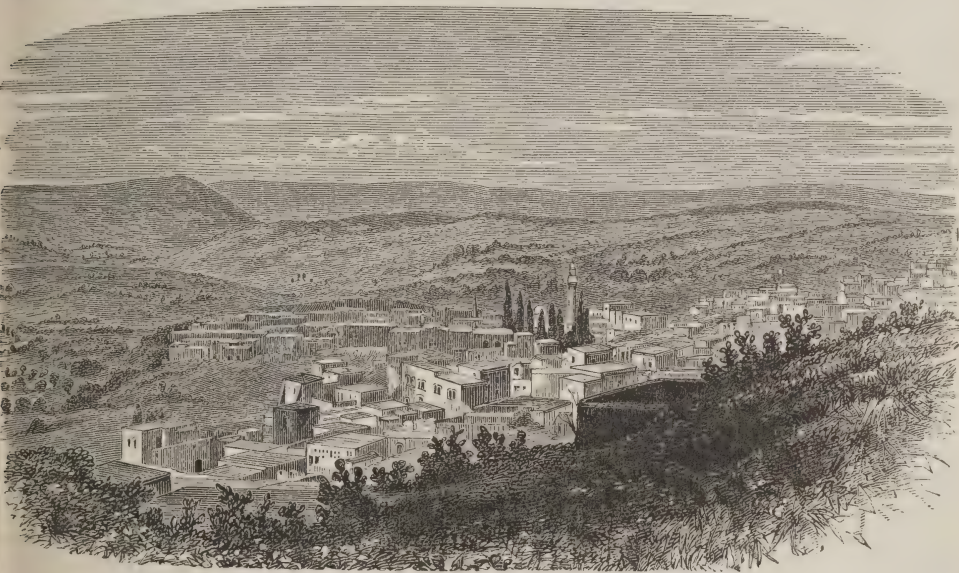
that he was set as a sign of Christ's coming, and that the spirit of the Saviour dwelt in him. For these opinions the parliament in 1656 condemned him to stand with his head in the pillory for two hours, be whipped at the cart's tail from Palace yard to the old exchange, have his tongue bored with a red-hot iron, and his forehead branded with the letter B, as the stigma of a blasphemer; and he was afterward imprisoned for nearly three years. After his liberation he hastened homeward, but died on the way. Naylor's theological essays, epistles, &c., were published in 1716, and "Memoirs of the Life, Ministry, Trial, and Sufferings of James Naylor" appeared in 1719.

NAZAREANS. See CHRISTIANS OF ST. JOHN.

NAZARENE, a term of contempt applied to Christ and his first disciples, from Nazareth, the place of his residence, a poor town in the despised region of Galilee. There was a sect

of heretics called Nazarenes in the 2d century, who insisted on the necessity of combining the Mosaic ceremonies with the religion of Christ. In Hungary, in 1857, arose a new sect which in the ten succeeding years made so many converts as to attract the attention of the government. Calling themselves Nazarenes, without disputing the divine origin of the Old Testament, they claim to derive their creed exclusively from the New Testament. They have no ordained clergy, and any man may explain the Scriptures. They practise baptism by immersion and for adults only. The funerals are simple, and the dead are not mourned for. Marriage is regarded as a purely civil institution, and Sunday is not considered sacred.

NAZARETH (now *En-Nazireh*), a town of Palestine, 20 m. S. E. of Acre, and 65 m. N. of Jerusalem; pop. about 4,000, about one fourth of whom are of the Greek church, the



Nazareth.

rest being Moslems, Greek Catholics, Latins, and Maronites. It is beautifully situated in a valley surrounded on all sides by hills. The houses are mostly of stone, well built, and flat-roofed. The population has a more prosperous appearance than in any other part of the country, and the women of Nazareth are famous for their beauty. At the periodical feasts there is an immense influx of pilgrims. The principal edifices are the Latin convent, the finest in Palestine, the Latin church of the Annunciation, the Casa Nuova, or Christian caravansary, a Mohammedan mosque, and a khan. It is celebrated as the residence of Christ during the first 30 years of his life.

NAZARETH, a village of Northampton co., Pa., 60 m. N. by W. of Philadelphia and 9 m. N. W. of Easton; pop. in 1870, 949. It was

founded by George Whitefield in 1740, who, before completing an edifice in course of erection intended as a school for the instruction of African children, sold it to Count Zinzendorf, who finished it for the use of the Moravians. The village contains two large churches and a Moravian academy for boys.

NAZARITE (Heb. *nazir*), under the Levitical law, a person who for a certain period was bound by a vow to keep his hair unshorn, and to abstain from wine and every other kind of strong drink and from contact with the dead. Samson was a Nazarite.

NEAL, Daniel, an English historian, born in London, Dec. 14, 1678, died in Bath, April 4, 1743. He spent three years at the universities of Utrecht and Leyden, and became assistant pastor of an Independent congregation in Lon-

don. His principal works are "History of New England" (2 vols., London, 1720), and "History of the Puritans" (4 vols., 1732-'8; edited by Toulmin, 6 vols., 1793, and 3 vols., 1837).

NEAL, Alice Bradley. See HAVEN.

NEAL, David. See supplement.

NEAL, John, an American author, born in Falmouth (now Portland), Me., Aug. 25, 1793, died there, June 20, 1876. His parents were Friends, with which society he also was connected until the age of 25, when, principally for his inability to "live peaceably with all men," he received his dismissal. About the age of 12 he was employed in Portland as a shop boy; a few years later he taught drawing and penmanship in the principal towns of Maine; in 1814-'15 he was a dry-goods retailer and jobber in Boston and New York, and afterward established himself in Baltimore as a wholesale dealer in partnership with John Pierpont. In 1816 they failed, and Neal began the study of the law. He read through a legal course intended to embrace a period of several years in a twelvemonth, besides attending lectures and studying several languages. In 1816 he produced a review of the works of Byron, written it is said in four days, which appeared from month to month until completed in the "Portico," a Baltimore magazine. In 1817 he published his first novel, "Keep Cool" (2 vols., Baltimore), originally called "Judge Not," followed the next year by "The Battle of Niagara, Goldau, and other Poems." In 1819 appeared "Otho, or the Bastard," a five-act tragedy; and about the same time he assisted Dr. Watkins in writing the "History of the American Revolution by Paul Allen." Admitted to the Maryland bar in 1819, he entered upon practice, but continued his literary labors. Besides preparing an index for "Niles's Register," then amounting to upward of 50 volumes, he published in 1823 the novels "Seventy-Six, a Romance of the Revolution," "Logan," "Randolph," and "Errata." They were severally written, according to his own account, in periods of from 27 to 39 days. He went to England in January, 1824, and wrote articles for various periodicals, including "Sketches of the five American Presidents and the five Candidates for the Presidency" for "Blackwood's Magazine." His literary efforts attracted the notice of Jeremy Bentham, who invited him to take up his residence in his house, of which he remained an inmate during a considerable portion of his stay in England. In 1827 he returned to America, and settled in Portland, where he employed himself in practising law, writing, and lecturing; "and that no superfluous energy might run to waste, established gymnasiums and gave lessons to large classes in sparring and fencing." This life he continued till 1850, when he gave up his profession. He also published "Brother Jonathan" (3 vols., London and Edinburgh, 1825); "Rachel Dyer" (Portland, 1828); "Bentham's Morals and Legislation" (Boston,

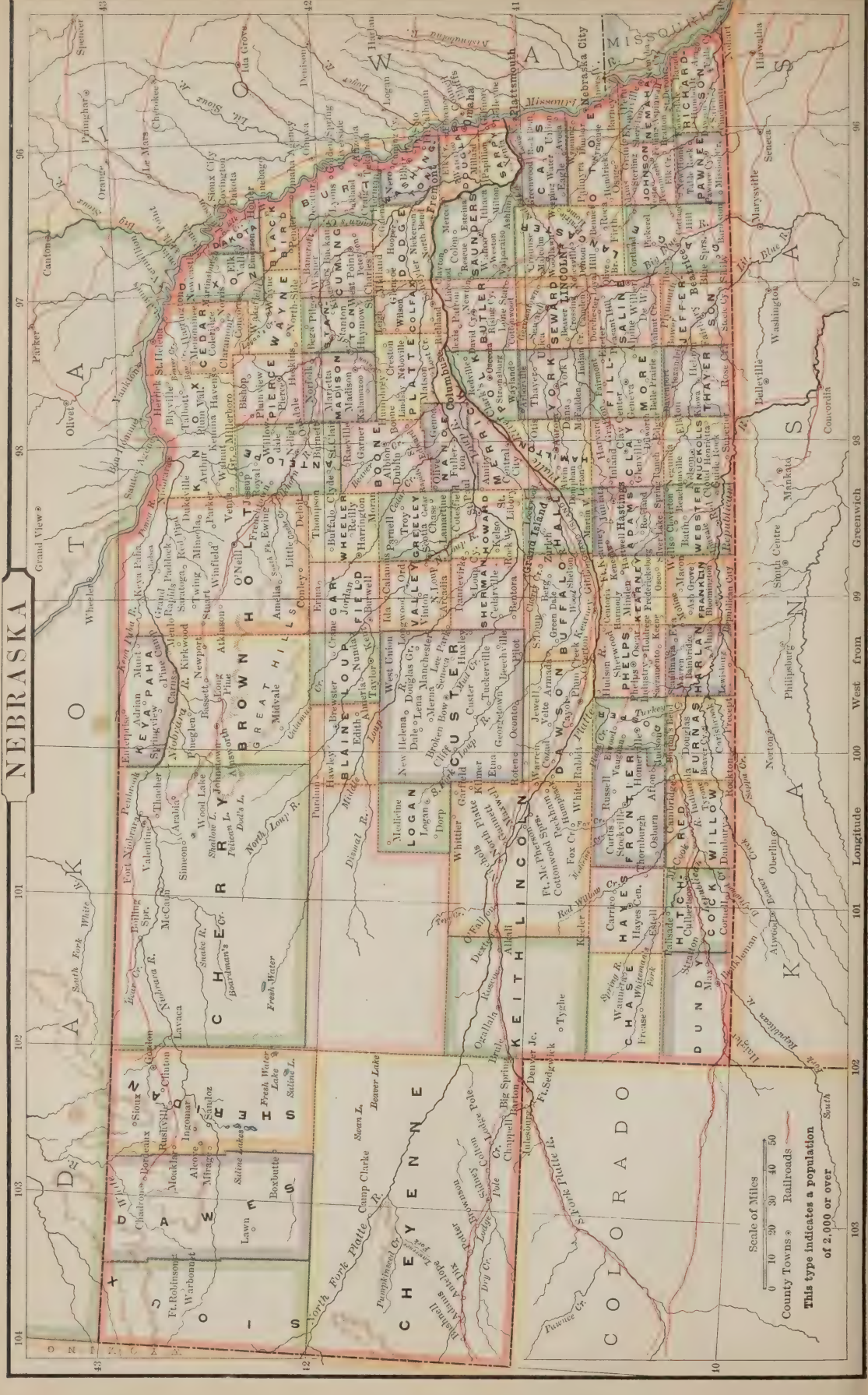
1830); "Authorship, a Tale" (1833); "The Down Easters" (2 vols., New York, 1833); "One Word More" (1854), essays of a religious character; "True Womanhood, a Tale" (Boston, 1859); "Wandering Recollections of a Somewhat Busy Life" (1869); and "Portland Illustrated" (1874).

NEAL, Joseph Clay, an American humorist, born in Greenland, N. H., Feb. 3, 1807, died in Philadelphia, July 3, 1848. He resided several years in Pottsville, Pa., but in 1831 became the editor of the "Pennsylvanian," a newspaper of Philadelphia. He went abroad in 1841, returned in 1842, and in 1844 established "Neal's Saturday Gazette," a weekly literary journal. In 1837 he published "Charcoal Sketches, or Scenes in a Metropolis;" in 1844 "Peter Ploddy and other Oddities;" and subsequently a new series of "Charcoal Sketches." In 1846 he married Emily Bradley, who afterward acquired distinction as an author under the pseudonym of "Cousin Alice." (See HAVEN, ALICE BRADLEY.)

NEALE, John Mason, an English clergyman, born in London, Jan. 24, 1818, died at East Grinstead, Sussex, Aug. 6, 1866. He graduated in 1840 at Trinity college, Cambridge, where he had taken the members' prize in 1838, and where he obtained the Seatonian prize for a sacred poem nine times between 1845 and 1861. He took orders in 1842, and became incumbent of Crawley in Sussex. In May, 1846, he was appointed warden of Sackville college, East Grinstead. He was allied to the high church party, and in 1855 founded the sisterhood of St. Margaret. He was the author of about 70 books, of which the most important are the following: "History of the Holy Eastern Church, the Patriarchate of Alexandria" (2 vols., 1850-'51); *Sequentiæ ex Missalibus Germanicis* (1852); "Mediæval Preachers and Mediæval Preaching" (1857); "History of the so-called Jansenist Church of Holland" (1858); "Commentary on the Psalms" (1860); *Hymni Ecclesiæ* (new ed., 1865); "Essays on Liturgiology and Church History" (1863); "The Liturgies, in Greek, of St. Mark, St. James, St. Clement, St. Chrysostom, and St. Basil" (1868); "Hymns of the Eastern Church," with notes and introduction (1871).

NEANDER, Johann August Wilhelm, a German church historian, born in Göttingen, Jan. 17, 1789, died in Berlin, July 14, 1850. His original name was David Mendel. His father was a Jewish peddler; his mother was an intelligent and pious Jewess, and soon after the birth of David, her youngest child, removed with him to Hamburg. He was reared in poverty, but by the assistance of friends was enabled to satisfy his desire for a liberal education in the Johanneum of Hamburg. He soon attracted the notice of his teachers by his talent and industry, as well as by the oddity of his appearance and the awkwardness of his manner. He looked like a simpleton, and was the source of much amusement to his fellow stu-

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dents; but he took no notice of it, and lived in a world of abstraction. He associated especially with Varnhagen von Ense, Chamisso the poet, Wilhelm Neumann, Noodt, and Sieveking, and formed with them a literary association under the name of the "Polar Star." Schleiermacher's "Discourses on Religion" made a powerful impression on Neander; and in 1806 he publicly renounced Judaism and was baptized, adopting the name of Johann August Wilhelm Neander, from his teacher Johann Gurlitt and his friends August Varnhagen and Wilhelm Neumann (in Greek νέος ἀνὴρ, new man). He studied theology at Halle and Göttingen, and returned to Hamburg to enter the ministry. In 1811 he began to deliver theological lectures in Heidelberg, and in 1812 was called to the newly founded university of Berlin as professor of church history. He soon became one of the theological celebrities of the metropolis, and continued to labor there as teacher and writer with very little interruption till his death. His last words, addressed to his sister, who attended to his wants (for he never married), were: "I am weary, let us go home!" In his outward appearance he was of middle size and slender frame. He had strongly marked Jewish features, bushy eyebrows, and weak sight, being at last blind. He dressed carelessly, with jack-boots and a shabby hat. In the lecture room his eccentricities were prominent, but his earnestness and enthusiasm commanded attention. He lectured on nearly all branches of exegetical and systematic theology, but especially on history. As an author he won the honorable title of "father of church history." His reputation mainly rests on the "General History of the Christian Religion and Church," from the close of the apostolic age to the council of Basel in 1431 (6 vols. in 11 parts, 1825-'52; 3d ed., 1851-'6; translated into English, in part by Rose, and in full by Prof. Torrey, and several times reprinted in Boston, Edinburgh, and London). He also wrote on Julian the Apostate (1812), St. Bernard (1813), Gnosticism (1818), St. Chrysostom (2 vols., 1821-'2), and Tertullian (1825); a "History of the Apostolic Age" (2 vols., 1832-'3); a "Life of Jesus Christ," in refutation of Strauss (1837); and on "Christian Life" (3 vols., 1840). To these must be added a few popular practical commentaries on the Epistle to the Philippians, on the Epistle of St. James, and the first Epistle of St. John (translated by Mrs. H. C. Conant). His minor essays were collected by Jacobi (Berlin, 1851). After his death were published his lectures on the "History of Christian Doctrine" (1857), and on the "Epistles to the Corinthians" (1859). A complete collection of his works has appeared (13 vols., Gotha, 1862-'6). His library was purchased for the theological seminary of Rochester, N. Y.

NEAPOLIS. **I.** An ancient town of Campania. See NAPLES. **II.** An ancient town of Palestine. See NABLUS, and SHECHEM.

NEARCHUS, a Greek admiral of the 4th century B. C. He was a native of Crete, was prominent at the court of Macedon during the reign of Philip, and having participated in the intrigues of Alexander against his father, he was banished. On the death of Philip he was recalled, and after the conquest of the maritime provinces of Asia was made governor of Lycia and other regions S. of the Taurus. In 329 he joined Alexander in Bactria with a reinforcement of Greek mercenaries. During the Indian expedition he was intrusted with the command of the fleet, and when the armament arrived down the Indus at the ocean, he offered to conduct the ships to the shores of Persia. He began his voyage Sept. 21, 325, and after encountering numberless dangers reached the mouth of the Anamis, a river of Caramania, emptying at the entrance to the Persian gulf, Dec. 9, five days' journey from which place Alexander was then encamped. Sailing along the N. shore of the Persian gulf to the Pasitigris, Nearchus ascended that stream and arrived at Susa in February, 324. Alexander had already arrived there, and bestowed upon the admiral, besides other marks of favor, a crown of gold and the daughter of the Rhodian Mentor in marriage. After the death of Alexander, Nearchus was restored to the government of his former provinces, which he held as the dependant of Antigonius. The latest mention of him in history is in 314, when Antigonius appointed him to attend his son Demetrius Poliorcetes as a counsellor on his first taking command of an army. Nearchus is said to have written an account of his voyage (*Παράπλους*), the substance of which has been probably preserved in the *Indica* of Arrian.

NEATH (popularly called Castle Nedd), a town of Glamorganshire, S. Wales, on the river Neath, 30 m. N. W. of Cardiff; pop. in 1871, 9,184. It occupies the site of a Roman station (*Nidum*), and contains relics of an old castle and abbey. The town has been much improved within a few years. The port is accessory to that of Swansea, accommodating vessels of 300 tons, but the principal trade is carried on in barges to Briton Ferry, 2 m. below the town. Large iron, copper, and tin works are in the vicinity, and besides these metals coal and other articles are exported.

NEBRASKA, a western state of the American Union, the 24th admitted under the constitution, lying between lat. 40° and 43° N., and lon. 95° 25' and 104° W. from Greenwich. It is bounded N. by Dakota, E. by Iowa and Missouri, from which it is separated by the Missouri river, S. by Kansas and Colorado, and W. by Colorado and Wyoming; area, 75,995 sq. m. The width from N. to S. is about 210 m., and the length in the central part about 420 m. The state is divided into 64 counties (the N. W. portion being unorganized), viz.: Adams, Antelope, Boone, Buffalo, Burt, Butler, Cass, Cedar, Chase, Cheyenne, Clay, Colfax, Cuming, Dakota, Dawson, Dixon, Dodge,

Douglas, Dundy, Fillmore, Franklin, Frontier, Furnas, Gage, Garber, Gosper, Greeley, Hall, Hamilton, Harlan, Hitchcock, Holt, Howard, Jefferson, Johnson, Kearney, Keith, Knox, Lancaster, Lincoln, Madison, Merrick, Nemaha, Nuckolls, Otoe, Pawnee, Pierce, Phelps, Platte, Polk, Red Willow, Richardson, Saline, Sarpy, Saunders, Seward, Sherman, Stanton, Thayer, Valley, Washington, Wayne, Webster, York. The capital is Lincoln, in the S. E. part of the state, which in 1870 had 2,441 inhabitants, and in 1874 about 6,500. Omaha, on the E. border, is the chief city, having 20,000 inhabitants in 1874; next in importance is Nebraska City, containing 6,050 inhabitants in 1870. The total population of Nebraska (exclusive of Indians not taxed) in 1860 was 28,841, and in 1870, 122,993, including 122,117 white, 789 colored, and 87 Indians; 70,425 males and 52,568 females; 92,245 of native and 30,748 of foreign birth. Of those of native birth, 18,530 were born in the state, 9,655 in Illinois,



State Seal of Nebraska.

6,040 in Indiana, 7,611 in Iowa, 4,634 in Missouri, 9,246, in New York, 10,729 in Ohio, and 6,991 in Pennsylvania. Of the foreigners, 10,954 were natives of Germany, 2,635 of British America, 3,603 of England, 4,999 of Ireland, and 2,352 of Sweden. The density of population was 1.62 to a square mile. In 1874 the total population was returned at 223,657, the large increase since 1870 being mainly due to the construction of railroads. In 1870 the number of male citizens 21 years old and upward was 36,169. There were in the state 34,524 persons between the ages of 5 and 18 years; the total number attending school was 17,956; 2,365 persons 10 years of age and over were unable to read, and 4,681 could not write. The number of illiterates 21 years old and over was 2,125, of whom 1,169 were females. There were 22 blind, 55 deaf and dumb, 28 insane, and 25 idiotic. Of the total population 10 years old and over (88,265), there were engaged in all occupations 43,837; in agriculture, 23,115, of whom 5,899 were laborers and 17,037 farmers

and planters; in professional and personal services, 10,331, including 183 clergymen, 4,940 laborers not specified, 204 lawyers, 247 physicians and surgeons, and 316 teachers not specified; in trade and transportation, 4,628; and in manufactures and mechanical and mining industries, 5,763. The total number of deaths in 1870 was 1,000, being 0.81 per cent. of the population. The number of deaths from consumption was 87, being one to 11.5 deaths from all causes; from pneumonia 88, being one to 11.4 from all causes; from whooping cough 37, from measles 41, from scarlet fever 90, and from enteric fever 52. In 1873 there were 6,579 Indians in Nebraska, on reservations comprising 892,800 acres. In the N. W. part of the state were 917 Santee Sioux, occupying 83,200 acres; in the central, 2,000 Pawnees on 288,000 acres; in the N. E., 1,522 Winnebagoes on 128,000 acres, and 1,001 Omahas on 345,600 acres; in the S. E., 221 Iowas and 95 Sacs and Foxes of Missouri, on 32,000 acres; and in the S., 447 Otoes and Missouris, on a reservation of 16,000 acres. Schools are maintained among these tribes, and other efforts are made by the general government to civilize them.—The general surface of Nebraska approximates to a vast plain, rising gradually from the Missouri toward the mountains. The bottoms are level; the prairies, of which the surface mostly consists, are either gently undulating or broken into low hills and ridges. There are few hills of magnitude, and no mountains except at the west and northwest, where the land rises into the Black Hills and Rocky mountains. No large lakes have been discovered, but lakelets, rivers, and streams are numerous. The only navigable river, however, is the Missouri, which forms the N. E. and E. boundary line. Entering the state near the N. W. corner, and flowing E., is the Niobrara, which, after forming a portion of the N. boundary, empties into the Missouri near the N. E. corner of the state. The Keya Paha, a tributary of the Niobrara, also forms the boundary line for a short distance on the north. The principal river is the Platte, which, rising in the Rocky mountains in Colorado, flows E. through the central portion of the state, and empties into the Missouri. It is wide, rapid, and shallow, and passes through a valley which is remarkable for its fertility, and which for 200 m. W. from Omaha is from 8 to 10 m. wide. The Platte has numerous tributaries on the north, the chief of which are Wood river, Loup fork, and Elkhorn river. It has no important tributary from the south, but that portion of the state is well watered by streams flowing into Kansas, the chief being the Republican, Little Blue, West Blue, and Big Blue rivers. The Great Nemaha and Little Nemaha are small rivers in the S. E. part of the state, flowing into the Missouri.—Excepting that made in 1867 under the direction of the United States geologist, Dr. F. V. Hayden, there has been no geological survey of Nebraska. But four of the principal geological

formations are represented in the state, carboniferous, Permian, cretaceous, and tertiary. Of the carboniferous strata only the upper members occur, and these are overlaid, from the longitude of Lincoln west, by the Permian, cretaceous, and tertiary deposits. Minerals have not yet been found to any considerable extent. Thin beds of bituminous and block coal exist in the S. E. counties, and of lignite in the cretaceous and tertiary. The scarcity of coal renders more valuable the extensive beds of peat found in some parts of the state. Some iron ores occur, but the coal yet found is not sufficient to utilize them. Stone for building purposes is found, including limestone, dark yellowish gray sandstone, and a dark red free-stone. Clay for the manufacture of brick is easily obtained, and good potter's clay is abundant. In the S. E. portion of the state are extensive saline deposits. The principal basin is in Lancaster co. near Lincoln, and embraces an area of 12 by 25 m. These springs contain by weight 29 per cent. of remarkably pure salt. The salt is obtained by solar evaporation, which is facilitated by the marked dryness of the atmosphere. Alum has also been discovered.—The eastern portion of Nebraska is a rich agricultural region, while the western half is well adapted to grazing. The line of division is about lon. 99° W., although there is a large amount of fine agricultural lands W. of this line, and some grazing lands E. of it. The agricultural region embraces about 30,000 sq. m., extending about 150 m. W. of the Missouri, and in the valley of the Platte about 300 m. It is divided into bottom and prairie lands. The soil of the latter is a rich, black vegetable mould from 2 to 5 ft. deep, slightly impregnated with lime, and withstands great extremes of drought. The bottom lands along the river banks have a rich alluvial soil. Wheat, corn, barley, oats, sorghum, flax, hemp, and all vegetables flourish, and below lat. 42° sweet potatoes are easily cultivated. Wild plums and grapes are found in great abundance, while raspberries, strawberries, gooseberries, cherries, and other small fruits are common. Tobacco also finds a congenial soil and climate. Apples, plums, and pears are cultivated, and peaches succeed S. of the Platte river. The wild grasses, of which Dr. Aughey has classified 150 species, grow luxuriantly upon the bottom and table lands, yielding from one and a half to three tons per acre; many are exceedingly nutritious, and admirably adapted to the raising of sheep and cattle. Cultivated grasses, as the blue grass of Kentucky and timothy, are raised with great success. Large numbers of cattle are brought from Texas and Kansas to be fattened on the grasses of Nebraska, preparatory to sale. The grazing region comprises about 23,000,000 acres, and is generally well watered. Wood is of free natural growth only on the bluffs and river banks, but the species are numerous. Cottonwood is the most common; oak, elm, maple, black walnut, cedar, hickory, and hack-

berry are also found. Planted timber grows rapidly on the prairie. Forests of pine are reported to exist in the N. W. part of the state.—The climate is dry and exhilarating; the mean temperature in winter is about 22°, and in summer about 70°. The heat of the summer is tempered by the prairie winds, and the nights are generally cool. According to the observations made by the United States signal service at Omaha (lat. 41° 16', lon. 96°), the annual mean as indicated by the barometer was 29.9 inches; thermometer, 48.1°; total fall of rain, including snow, 34.8 inches; prevailing wind, southeast. The greatest amount of rain falls in May and June. Of the total area of the state (48,636,800 acres), 29,651,220 acres had been surveyed up to June 30, 1873. The number of acres of improved farm land in 1870 was 647,031; number of farms, 12,301, of which 787 embraced less than 10 acres each, 1,541 from 10 to 20, 5,096 from 20 to 50, 3,379 from 50 to 100, 1,487 from 100 to 500, and 11 from 500 to 1,000; cash value of farms, \$30,242,186; of farming implements and machinery, \$1,549,716; wages paid during the year, including the value of board, \$882,478; estimated value of all farm productions, including betterments and additions to stock, \$8,604,742; value of orchard products, \$9,932; of produce of market gardens, \$30,649; of forest products, \$36,307; of home manufactures, \$36,951; of animals slaughtered or sold for slaughter, \$854,850; of live stock, \$6,551,185. The productions were 2,109,321 bushels of spring and 15,765 of winter wheat, 13,532 of rye, 4,736,710 of Indian corn, 1,477,562 of oats, 216,481 of barley, 3,471 of buckwheat, 3,332 of peas and beans, 739,984 of Irish potatoes, 762 of sweet potatoes, 133 of grass seed, 404 of flaxseed, 5,988 lbs. of tobacco, 74,655 of wool, 1,539,535 of butter, 46,142 of cheese, 100 of hops, 24 of flax, 10 of maple sugar, 707 of wax, 28,114 of honey, 77,598 gallons of sorghum molasses, 470 of wine, 95,059 of milk sold, and 169,354 tons of hay. The live stock consisted of 30,511 horses, 2,632 mules and asses, 28,940 milch cows, 5,931 working oxen, 45,057 other cattle, 22,725 sheep, and 59,449 swine, besides 3,390 horses and 812,788 cattle not on farms. There were 670 manufacturing establishments, having 63 steam engines of 1,865 horse power and 67 water wheels of 1,446 horse power; hands employed, 2,665; capital invested, \$2,169,963; wages paid during the year, \$1,429,913; value of materials used, \$2,902,074; of products, \$5,738,512. The statistics of the principal branches are as follows:

INDUSTRIES.	Number of establishments.	Hands employed.	Capital invested.	Value of products.
Blacksmithing.....	90	188	\$77,210	\$287,900
Boots and shoes.....	50	125	74,110	195,722
Bread and other bakery products.....	16	89	35,650	60,350
Brick.....	17	109	22,900	61,865
Butchering.....	9	89	53,700	311,328

INDUSTRIES.	Number of establishments.	Hands employed.	Capital invested.	Value of products.
Carpentering and building.	89	216	\$45,435	\$535,520
Clothing.	87	75	29,610	106,605
Flouring mill products.	60	183	591,900	1,516,150
Furniture.	16	27	17,605	38,980
Gas.	1	5	20,000	44,955
Iron castings.	3	65	67,840	196,518
Jewelry.	14	32	71,100	67,200
Liquors, distilled.	1	14	85,000	146,789
" malt.	15	39	52,400	53,832
Lumber, sawed.	50	202	152,200	278,205
Machinery, railroad repairing.	4	701	368,810	797,423
Painting.	16	35	15,400	46,250
Printing and publishing, newspaper.	10	94	92,100	161,400
Saddlery and harness.	28	71	51,075	152,657
Soap and candles.	3	7	8,800	25,900
Tin, copper, and sheet-iron ware.	27	72	43,650	159,973
Tobacco, cigars.	12	43	29,400	109,734

Manufacturing industries and trade have largely increased since 1870. Nebraska has only a domestic commerce. In 1874 more than 1,500,000 bushels of grain were sent to market by the Burlington and Missouri River railroad alone. Omaha was in 1870 made a United States port of delivery, belonging to the customs district of Louisiana. In November, 1874, 10 national banks were in operation, with a paid-in capital of \$1,025,000 and an outstanding circulation of \$895,900, being \$7 28 per capita, 1·3 per cent. of the wealth of the state, and 87·4 per cent. of the banking capital. The state had 122 m. of railroad in 1865, 473 in 1867, 943 in 1871, 1,075 in 1873, and 1,120 in 1874. In the last named year several important railroads were projected and in process of construction. The lines in operation in 1874 are represented in the following statement :

NAMES OF CORPORATIONS.	TERMINI.	Miles completed in the state in 1874.	Total length between termini when different from preceding.
Atchison and Nebraska.	Atchison, Kan., and Lincoln.	109	147
Brownville and Fort Kearney.	Brownville and Junction of St. Joseph and Denver City railroad.	10	98
Burlington and Missouri River.	Plattsmouth and Kearney Junction.	190	....
Leased, Omaha and Southwestern.	Omaha and Oreadopolis.	18	....
Midland Pacific.	Crete and Beatrice.	30	....
Omaha and Northwestern.	Nebraska City and Seward.	88	....
St. Joseph and Denver City.	Omaha to southern line of Dakota.	40	180
Sioux City and Pacific.	Elwood, Kan., and Hastings.	89	227
Leased, Fremont, Elkhorn, and Mo. Valley.	Sioux City, Ia., and Fremont.	27	107
Union Pacific.	Fremont and Wisner.	51	....
	Omaha and Ogden, Utah.	473	1,038

—The constitution of 1866 limits the number of senators to 13 and of representatives to 39 until 1876, when the number may be increased by the legislature, but not beyond 25 senators and 75 representatives. Senators and representatives are elected biennially on the second Tuesday of October in even years, and hold office for two years from the first of January ensuing. The legislature meets biennially on the Thursday after the first Monday in January, odd years. Each member receives \$3 for each day's attendance during the session, and 10 cents for every mile of travel in going to and from the capital. Compensation is not allowed for more than 40 days at any one session. The executive department comprises a governor, secretary of state, auditor, and treasurer, who are chosen at the same time as members of the legislature and hold their offices for two years, except the auditor, whose term is four years. The constitution fixes the annual salary of the governor at \$1,000; secretary of state, \$600; auditor, \$800; treasurer, \$400. The judicial power is vested in a supreme court and district, probate, and justices' courts. The supreme court comprises a chief and two associate justices, who are elected by the people for six years, and receive an annual salary of \$2,000 each. All other judicial officers are paid for their services, the fees being prescribed by law. Two terms of the supreme court are held each year in Lincoln. The state is divided into three judicial districts, in which the courts

are held by the justices of the supreme court. Each county has a probate court, which, besides the ordinary duties of such tribunals, has jurisdiction in civil actions where the amount does not exceed \$500. Probate judges and justices of the peace are elected by the people. The property owned by a woman at her marriage, and any property which she may subsequently acquire, except from her husband, is free from the husband's control and not subject to his debts. A married woman may convey her separate estate, make contracts, carry on a trade or business, and sue and be sued, in the same manner as an unmarried woman. The grounds of divorce are: adultery, impotence, sentence to imprisonment for three years or more, desertion for two years, habitual drunkenness, extreme cruelty, and consent obtained by force or fraud. The legal rate of interest in absence of agreement is 10 per cent., and 12 per cent. may be lawfully agreed upon. Nebraska is represented in congress by two senators and one representative, and has therefore three votes in the electoral college.—Practically the state has no debt. On Nov. 30, 1874, the outstanding liabilities amounted to \$352,400, of which \$342,957 was held by the permanent school fund, the state paying interest; and the state had resources to the amount of \$221,600, consisting of unpaid taxes, &c. The receipts and disbursements of the state government for the eleven months ending Dec. 1, 1874, were reported as follows:

FUNDS.	Receipts.	Disbursements.
General fund.....	\$529,704 95	\$507,584 87
Sinking fund.....	117,553 69	126,554 94
Permanent school fund.....	252,518 47	258,303 13
Temporary school fund.....	467,008 88	864,387 93
Temporary university fund.....	50,292 46	50,292 46
Judiciary fund.....	12,773 41	11,488 86
Penitentiary building fund.....	27,223 47	21,575 97
Insane asylum building fund.....	86 50	50 00
Normal school building fund.....	5,875 20	8,759 18
Normal school tuition fund.....	4,733 85	4,597 82
Salt (royalty) fund.....	52 66	78,377 12
State building fund.....	1,250 00	1,250 00
In hand Jan. 1, 1873.....	198,287 65	.....
Total.....	\$1,667,695 69	\$1,433,152 28
Balance in treasury, Nov. 30, 1874.....	.....	\$234,548 41

The total valuation of the state, as reported by the state board of equalization, was \$55,549,867 in 1871, \$69,873,818 in 1872, \$78,419,480 in 1873, and \$81,218,813 in 1874. In the last year the lands held by private owners and subject to taxation amounted to 11,000,579 acres, the assessed value being \$43,004,800; town lots, \$9,941,809; money used in merchandise, \$2,448,235; in manufactures, \$522,410; stocks and shares, \$979,455; moneys and credits, \$1,578,329; household furniture, \$343,762. There were 87,449 horses, valued at \$3,906,778; 229,469 neat cattle, \$2,973,221; 7,615 mules and asses, \$417,911; 30,329 sheep, \$42,556; and 233,652 swine, \$367,576. The railroad property was valued at \$11,183,114, and telegraph property at \$61,555. The taxes levied for 1874 amounted to \$502,933 78, being 6½ mills on the dollar, viz.: for the general fund, \$200,995 77, 2½ mills; sinking fund, \$79,864 77, 1 mill; school fund, \$161,507 89, 2 mills; penitentiary fund, \$40,376 94, ½ mill; and university fund, \$20,188 41, ¼ mill. The property of corporations is taxed in the same manner as that of individuals. The institutions supported by the state are the institute for the deaf and dumb opened at Omaha in 1869, the asylum for the insane opened at Lincoln in 1871, and the penitentiary, which is also at Lincoln. In 1875 an act was passed to establish an asylum for the blind at Nebraska City.—The school lands of Nebraska comprise about 2,700,000 acres, which, if sold at the minimum price (\$7 per acre), would give a permanent school fund of \$18,900,000. The schools are supported by the proceeds arising from the sale and lease of school lands, from a general tax of two mills, and from fines, licenses, and dog tax. The apportionment is made by the state superintendent among the counties according to the number of children between the ages of 5 and 21 years. In June, 1874, \$107,764 were distributed among 72,991 children. To be entitled to a share of the state fund, districts having fewer than 75 pupils must support a school not less than three months, those having between 75 and 200 not less than six months, and those having more than 200 not less than nine months. There is no state board of education. The superintendent of public instruction is elected

by the people for four years, and receives an annual salary of \$2,000. County superintendents are also elected by popular vote. The most important statistics for the year ending Jan. 1, 1875, were as follows:

Number of school districts.....	2,215
“ “ houses.....	1,516
“ “ children.....	72,991
“ attending school.....	47,718
“ of male teachers.....	1,252
“ of female teachers.....	1,483
Average monthly wages of male teachers.....	\$87 98
“ “ of female teachers.....	\$82 12
Number of private schools.....	80
“ of pupils in private schools.....	863
Tax for building school houses.....	\$204,998
“ teachers' wages.....	\$73,920
Amount raised from all other sources.....	\$271,653
Total resources.....	\$988,740
Total expenditures for schools.....	\$1,004,957
Amount apportioned by state superintendent.....	\$292,471
“ per pupil.....	\$4 00
“ apportioned by county superintendents.....	\$201,871
Value of school houses and sites.....	\$1,546,480

The state normal school is at Peru, having a fine brick structure 90 by 63 ft. and three stories high above the basement. The institution comprises a model school with primary, junior, and senior departments, and a normal school with a three years' course of instruction. Tuition is free. During the fall term of 1873 there were 201 pupils in the model and 60 in the normal department. The number of teachers in the latter was six. Normal institutes are also held throughout the state, but not at the public expense. The university of Nebraska, at Lincoln, constitutes a part of the educational system of the state. It owes its existence to a congressional grant of 44,800 acres of land for the support of a state university, and the donation of 90,000 acres granted by congress to Nebraska for the establishment of a state college of agriculture and the mechanic arts. By the same law of 1869 the regents were authorized to establish a university comprising six departments or colleges: 1, a college of ancient and modern languages, mathematics, and natural science; 2, of agriculture; 3, of law; 4, of medicine; 5, of practical science, mechanics, and civil engineering; 6, of fine arts. The institution was opened in the autumn of 1871. In 1872 the department of literature, science, and art was organized, with two courses of four years each, and in 1873 that of agriculture, with courses of two, three, and four years. In 1873-'4 there were 7 instructors and 100 students. Both sexes are admitted. The other leading educational institutions are Nebraska college (Protestant Episcopal), at Nebraska City, and Doane college (Congregational), at Crete. The former affords instruction in classics, mathematics, science, and business, and has also a theological department. In 1874 it had a total of 10 instructors and 88 students. Doane college had 4 instructors and 50 students.—According to the census of 1870, there were in the state 390 libraries, having 147,040 volumes, of which 219 with 95,125 volumes were private, and 171 with 51,915 volumes were other than pri-

vate. The whole number of newspapers and periodicals was 42, having an aggregate circulation of 31,600, and issuing annually 3,388,500 copies. There were 7 daily, with a circulation of 6,850; 1 tri-weekly, 500; 30 weekly, 22,400; and 4 monthly, 1,850. In 1874 the total number had increased to 95, including 10 daily, 1 semi-weekly, 77 weekly, 1 semi-monthly, and 6 monthly. The total number of religious organizations in 1870 was 181, having 108 edifices, with 32,210 sittings, and property valued at \$386,000. The leading denominations were represented as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Property.
Baptist, regular.....	26	15	5,400	64,800
Christian.....	9	4	1,550	14,500
Congregational.....	10	7	2,050	38,500
Episcopal, Protestant...	15	12	3,500	81,000
Evangelical Association.	5	3	600	7,000
Lutheran.....	14	7	2,000	27,900
Methodist.....	50	36	10,150	113,400
Mormon.....	1	1	200	1,200
Presbyterian, regular...	24	9	3,125	43,300
Roman Catholic.....	17	11	2,935	34,900
Unitarian.....	3	3	700	4,500
United Breth'n in Christ	4	..	.....	.....
Universalist.....	3	..	.....	.....

—The territory of Nebraska was formed May 30, 1854, embracing 351,558 sq. m., extending from lat. 40° N. to the national boundary, and from the Missouri river W. to the crest of the Rocky mountains. On Feb. 28, 1861, 16,035 sq. m. were set off to the territory of Colorado, and on March 2, 228,907 sq. m. to Dakota. At the latter date Nebraska received from Washington and Utah territories a triangular tract of 15,378 sq. m. lying on the S. W. slope of the Rocky mountains N. of the 41st parallel and E. of the 110th meridian. This, however, was included in the 45,999 sq. m. taken from Nebraska March 3, 1863, to form the territory of Idaho. Nebraska was thus reduced to its present limits. In March, 1860, the question of forming a state government was submitted to the people and disapproved by a vote of 1,877 to 1,987. On April 19, 1864, an enabling act was passed by congress, providing for the admission of Nebraska into the Union; but the necessary action for admission was not taken at that time by the territory. The continuance of the war and the prevalence of Indian hostilities checked the growth of Nebraska; but prosperity came with the return of peace. Early in 1866 the territorial legislature framed a constitution, which was ratified by the people on June 21. The first legislature under the new government assembled July 4. On the 28th a bill for the admission of Nebraska as a state was passed by congress, but did not receive the signature of the president. In January, 1867, another bill for this purpose was passed, but was vetoed by the president on the ground that it embraced conditions not contained in the enabling act, that the proceedings attending the formation of the constitution were different from those

prescribed, and that the population of the territory did not justify its becoming a state. The bill, however, was passed over the executive veto by a vote of 30 to 9 in the senate, Feb. 8, and 120 to 44 in the house on the following day. The act was not to take effect "except upon the fundamental condition that, within the state of Nebraska, there shall be no denial of the elective franchise, or of any other right, to any person by reason of race or color, except Indians not taxed; and upon the further fundamental condition that the legislature of said state, by a solemn public act, shall declare the assent of said state to the said fundamental condition." This act was ratified by the legislature, which assembled at Omaha on Feb. 20 for that purpose, and compliance with the congressional conditions was announced by proclamation of the president of the United States, March 1, 1867. Soon after Lincoln was chosen as the seat of government. On May 2, 1871, delegates were elected to a convention to frame a new state constitution. This convention was in session from June 5 to Aug. 19, and completed a constitution which was rejected by the people, Sept. 19. Another convention was ordered. (See supplement.)

NEBRASKA CITY, a city and the capital of Otoe co., Nebraska, on the Missouri river, at the terminus of the Midland Pacific railroad, 35 m. S. of Omaha, and 45 m. E. by S. of Lincoln; pop. in 1860, 1,922; in 1870, 6,050. The Kansas City, St. Joseph, and Council Bluffs railroad runs along the opposite bank. The city is handsomely situated on rising ground, and is surrounded by a fine agricultural country. It has a beautiful brick court house, an opera house, gas works, two national banks, a private bank, an elevator, flouring mills, a distillery, two plough manufactories, four large public schools, a public library, two daily and four weekly (one German) newspapers, a Catholic convent, and 13 churches. It is the seat of Nebraska college, an Episcopal institution, which was organized in 1865, and has theological, collegiate, and preparatory or business departments. In 1874-'5 it had 10 professors and instructors, 88 students (most of whom were in the business department), and a library of 1,500 volumes. Nebraska City was founded in 1855.

NEBUCHADNEZZAR (on the Babylonian monuments, *Nabu-kuduri-uzur*), a Chaldean king of Babylon, born about 645 B. C., died in 561. He was the son of Nabopolassar, who toward the close of his reign sent him to repel the invasion of the Egyptian king Necho. He routed the Egyptians, and pursued them through Judea, which he reduced to a Babylonian dependency, but was recalled to Babylon by the death of his father (604), whom he succeeded as king. He brought back a multitude of captives, and employed them as slaves in the construction of gigantic works, the remains of which are still visible. He rebuilt all the cities of upper Babylonia upon a magnificent scale, and embellished

them with temples, palaces, aqueducts, and other public works. The ruins of more than 100 towns and cities contain inscriptions of his name. (See BABYLON, and BABYLONIA.)

Early in his reign the Jews and Phœnicians rebelled. Nebuchadnezzar took Jerusalem, carried many of its chief people away captive, including Jehoiachin the king, and made Zedekiah king as his vassal; and when several years later he rebelled, being aided by Egypt, Nebuchadnezzar again besieged Jerusalem, and after defeating the Egyptian king Apries (the Pharaoh-Hophra of Scripture), who came to its relief, compelled it to surrender. (See HEBREWS, vol. viii., p. 589.) During these wars his armies invested Tyre, and took it after a siege of 13 years. Four years later he marched through Palestine into Egypt, which he ravaged, but did not completely subjugate. He elevated Daniel and other Hebrew captives to high office in Babylon. (See DANIEL.)

The book of Daniel relates how he fell under the divine judgment on account of his pride, lost his reason, was deprived of his kingdom, and lived the life of a beast; and how he was restored to health and power, and acknowledged the judgment of God. It has been thought that his malady was a form of the madness called lycanthropy, in which the patient imagines himself a beast.

NEBULA (Lat., mist, vapor), an aggregation of stars or stellar matter having the appearance, through an ordinary telescope, of a small, cloud-like patch of light. An enlargement of telescopic power usually converts this appearance into a cluster of innumerable stars, besides bringing to light other nebulae before invisible. These in turn yield to augmented magnifying power; and thus every increase in the capacity of the telescope adds to the number of clusters resolved from nebulae, and of nebulae invisible to lower powers. Nebulae proper, or those which have not been definitely resolved, are found in nearly every quarter of the firmament, though abounding especially near those regions which have fewest stars. Scarcely any are found near the milky way, and the great mass of them lie in the two opposite spaces furthest removed from this circle. Their forms are very various, and often undergo strange and unexpected changes as the power of the telescope with which they are viewed is increased, so as not to be recognizable in some cases as the same objects. The spiral nebulae are an example of this transformation. This class was recognized by Lord Rosse through the use of his six-foot reflector. Many of them had been long known as nebulae, but their characteristic spiral form had never been suspected. They have the appearance of a maelstrom of stellar matter, and are among the most interesting objects in the heavens.

There is another class of nebulae which bear a close resemblance to planetary disks, and are hence called planetary nebulae. They are very



FIG. 1.—Spiral Nebula in Canes Venatici.

rare. Some of them present remarkable peculiarities of color. Sir John Herschel has described a beautiful example of this class, sit-

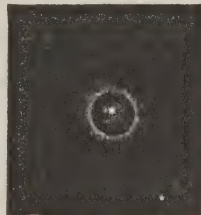


FIG. 2.—Stellar Nebula.

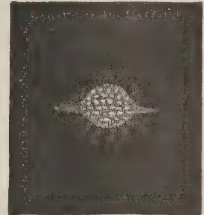


FIG. 3.—Planetary Nebula.

uated in the southern cross. But in telescopes of the highest power some of the so-called

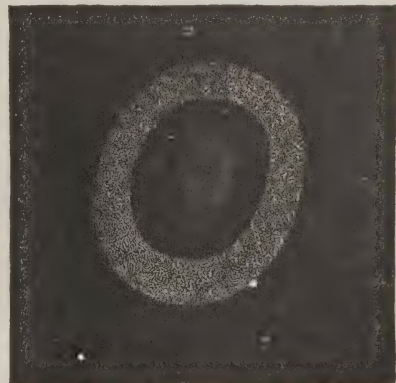


FIG. 4.—Annular Nebula in Lyra.

planetary nebulae assume a totally different appearance; and many of them are singularly complicated in structure, instead of being

simple globes of nebulous matter, as was formerly supposed. There are several which have perfectly the appearance of a ring, and are called annular nebulae. A conspicuous and beautiful example is situated in Lyra. Some appear to be physically connected in pairs like double stars. Most of the small nebulae have the general appearance of a bright central nucleus enveloped in a nebulous veil. This nucleus is sometimes concentrated as a star and sometimes diffused. The enveloping veil is sometimes circular and sometimes elliptical, with every degree of eccentricity between a circle and a straight line. There are some which, with a general disposition to symmetry of form, have great branching arms or filaments with more or less precision of outline. An example of this is Lord Rosse's Crab nebula. Another remarkable object is the nebula in Andromeda, which is visible with the naked eye, and is the only one which was discovered before the invention of the telescope. Simon Marius (1612) describes its appearance as that of a candle shining through horn. Besides the above, which have comparatively regular forms, there are others more diffused, and devoid of symmetry of shape. A remarkable example is the great nebula in Orion, discovered by Huygens in 1656. This nebula and that in Andromeda have been admirably delineated by the professors Bond of Harvard observatory. (See "Memoirs of the American Academy of Arts and Sciences," new series, vol. iii.) The great nebula in Argo, which Sir John Herschel has charted with exquisite care and elaborateness in his "Cape Observations," is another example of this class. In the southern firmament there are two extensive nebulous tracts known as the Ma-



FIG. 5.—Great Nebula in Orion.

gellanic clouds; the greater called Nubecula Major, and occupying an area of 42 square degrees; the smaller called Nubecula Minor, and covering about 10 square degrees. In these tracts are found multitudes of small nebulae and clusters. The number of these

wonderful objects which have been recognized in all the heavens is upward of 5,000. Of these fewer than 150 were known prior to the time of Sir William Herschel. In 1786 he communicated to the royal society a catalogue of 1,000 new nebulae and clusters; in 1789 a



FIG. 6.—Large Magellanic Cloud.

second catalogue of the same number of new objects; and in 1802 a third which included 500 more. In 1833 Sir John Herschel communicated to the royal society a catalogue of 2,306 nebulae and clusters in the northern hemisphere observed by him, 500 of which were new. In 1847 appeared his "Cape Observations," which contained catalogues of 1,708 nebulae and clusters in the southern heavens. —The application of spectroscopic analysis to these objects, by Huggins, Secchi, Vogel, and others, has resulted in the noteworthy discovery that while some among the nebulae are really clusters of stars, others consist in the main of gaseous matter. The former give spectra resembling in their general characteristics the spectra of stars; the latter give a spectrum of three bright lines (occasionally four), one line corresponding in position to a line in the spectrum of hydrogen, another corresponding to a line in the spectrum of nitrogen. The resolvable nebulae mostly give spectra of the former class, while the bright-line spectrum is given by all the irregular nebulae hitherto examined, and by the planetary nebulae. Of about 70 nebulae examined by Huggins, nearly one third gave the spectrum indicative of gaseity, the rest giving a stellar spectrum. —As to the nature of nebulae, two chief theories have been advanced. It was first suggested by Wright of Durham, and afterward maintained by Kant and Lambert, that the nebulae are stellar galaxies similar to our own star system. Sir W. Herschel, at the beginning of his researches into the constitution of the universe, adopted this view as respects certain nebulae which he regarded as external, while holding

(contrary to the usual statement in our text books of astronomy) that many nebulae form parts of our own star system. At a later stage of his labors he advanced the hypothesis commonly known as Herschel's nebular hypothesis, which however related only to certain orders of nebulae. At this stage Herschel for the first time indicated his ideas respecting the arrangement of all orders of stellar aggregations and nebulous matter. At the lower extremity of the scale he placed widely spread luminosity, such as he had first described in 1802. He passed from this irregularly spread luminosity, through all the orders of gaseous nebulae (irregular nebulae, planetary nebulae, nebulous stars) formed by the gradual condensation of the gaseous matter, until the star itself is formed; then he entered on the part of the series he had before recognized, passing on to the various orders of stellar aggregation, diffused clusters, ordinary stellar nebulae, and more and more condensed groups of stars, up to the richest star clusters. At this period (1814) we no longer find him speaking of external nebulae; not, it is to be presumed, that he no longer recognized the probability that other stellar galaxies besides our own exist, but that he no longer found it possible to discriminate those nebulae which are external from the far greater number which unquestionably form component parts of our sidereal system. The researches of the present writer into the subject dispose him to believe that our sidereal system extends far beyond the limits which have ordinarily been assigned to it, and that there are no nebulae which can be regarded as external to it. (See supplement.)

NEBULAR HYPOTHESIS. the celebrated speculation of Sir William Herschel, adopted and developed by Laplace, assigning the genesis of the heavenly bodies to the gradual aggregation and condensation of a highly attenuated self-luminous substance diffused through space. (See "Philosophical Transactions," 1802 and 1811.) To this hypothesis Herschel was led by his conclusion that there were nebulosities not composed of stars. The Rosse telescope having decomposed nebulae hitherto considered to be irresolvable, and exhibited symptoms of resolvability in others still more intractable, it was assumed that all nebulae are stellar, their nebulosity being solely a question of distance; and thus, the basis of Herschel's reasoning failing, the fabric of his hypothesis was thought to be demolished. Mr. Herbert Spencer came to its support in the "Westminster Review," No. cxxxvii. (July, 1858). The argument in its favor is substantially as follows. The assumption that all nebulae are remote galaxies does not invalidate the indications furnished by the structure of the solar system, which still points to a nebular origin just as significantly as before. But the assumption is inadmissible. The mode of distribution of the nebulae furnishes evidence of a physical connection with our stellar system; and this

evidence is confirmed by the fact of their resolvability with telescopic power which fails to make individually visible the most distant stars of our own milky way. If they are remote galaxies, it may be assumed that, speaking generally, the largest are the nearest, and therefore the most resolvable. But the fact is, the smallest are the most resolvable. Another difficulty is presented by the Magellanic clouds. (See NEBULA.) Sir John Herschel, considering the structure of the larger of these clouds, concludes that "it must be taken as a demonstrated fact that stars of the seventh or eighth magnitude, and irresolvable nebula, may coexist within limits of distance not differing in proportion more than as 9 to 10." ("Outlines of Astronomy," London, 1851, p. 615.) This clearly supplies a *reductio ad absurdum* of the popular doctrine. Assuming, for the sake of the argument, a rare, homogeneous, nebulous matter, widely diffused through space, the following successive changes will, on physical principles, take place in it: 1, mutual gravitation of its atoms; 2, atomic repulsion; 3, evolution of heat, by overcoming this repulsion; 4, molecular combination, at a certain stage of condensation, followed by, 5, sudden and great disengagement of heat; 6, lowering of temperature by radiation and consequent precipitation of binary atoms, aggregating into irregular flocculi and floating in the rarer medium, just as water when precipitated from air collects into clouds; 7, each flocculus will move toward the common centre of gravity of all; but being an irregular mass in a resisting medium, this motion will be out of the rectilinear, that is to say, not directly toward the common centre of gravity, but toward one or other side of it; and thus, 8, a spiral movement will ensue, which will be communicated to the rarer medium through which the flocculus is moving; and, 9, a preponderating momentum and rotation of the whole mass in some one direction, converging in spirals toward the common centre of gravity. Certain subordinate actions are to be noticed also. Mutual attraction will tend to produce groups of flocculi concentrating around local centres of gravity, and acquiring a subordinate vortical movement. These conclusions are shown to be in entire harmony with the observed phenomena. In this genetic process, when the precipitated matter is aggregating into flocculi, there will be found here and there detached portions, like shreds of cloud in a summer sky, which will not coalesce with the larger internal masses, but will slowly follow without overtaking them. These fragments will assume characteristics of motion strikingly correspondent to those of the comets, whose physical constitution and distribution are seen to be completely accordant with the hypothesis.—The physical characters resulting from the hypothesis are found to tally with the facts. In a rotating spheroid of æriform matter in the latter stages of

concentration, but before it has begun to take a liquid or solid form, the following actions will go on: 1, more and more rapid aggregation of its atoms into a smaller and denser mass, as the common centre of gravity is approached; 2, development of oblateness; 3, evolution of heat, greatest at the central parts; and, as a consequence, 4, circulation—currents setting from the centre toward the poles and thence to the equator, and counter currents from the equator to the centre. In the course of this round there will be, 5, an oscillation of temperature: first, from the centre outward—expansion by diminished pressure and other causes, and consequent lowering of temperature; secondly, from the equator inward—rise in temperature for converse reasons. 6. As a corollary to 4 and 5, external condensation will occur according to the laws of precipitation from gases, resulting in a belt of vapor about the equator, gradually widening and condensing into a fluid; 7, this fluid film will gradually extend itself till it eventually closes over at the poles, thus forming a thin hollow spheroid filled with gaseous matter; 8, at length the liquid shell will become very thick, the outer surface will experience a fall of temperature and begin to harden into a solid crust. This hypothesis explains the relative specific gravities of the planetary bodies, the formation of the asteroids, the earth's supposed interior structure, indications of past or present high temperature throughout the solar system, and the sun's incandescence.—These considerations relate chiefly to the physical changes undergone by a forming system. Laplace's nebular hypothesis deals with the changes of arrangement in the distribution of matter forming into a system under the action of dynamical laws. He takes as the basis of his theory certain features of our solar system which are not explained by the theory of gravitation. Gravity accounts for Kepler's laws, which are shown to be among its necessary consequences. No system could circulate in any manner around a centre, for instance, without the law holding that the numbers representing the cubes of the mean distances would be proportional to the numbers representing the squares of the periodic times. But a system could exist under gravity in which the planets would travel in widely eccentric orbits or in planes largely inclined to each other. Nor has it been proved that the planets might not safely circulate in different directions. Assuredly, if revolution in different directions, or in planes largely inclined to each other, or in very eccentric paths, might in the long run result in collisions and therefore in the destruction of the system as such, there is yet no reason to believe that all the axial rotations need take place in the same direction as the motions of revolution. But, to say the truth, none of those laws of harmony in our solar system, except the laws depending directly on gravity, can be regarded as essential

to the well being of the system; nor, as will presently appear, would the difficulty of regarding the system as other than a product of evolution be appreciably diminished by supposing that without those laws the destruction of the system must inevitably have occurred in the course of time. For it would be manifestly unreasonable to regard our system as one in which the original arrangements were fortuitously so happy that it has continued to exist as a system, if we find that the probability of these arrangements so existing by mere coincidence is exceedingly minute. Now, how small this probability is may be inferred by considering only the motion of the planets in one common direction. There are known at the present time 8 major planets and 137 minor planets (the number of these is increasing year by year). Thus there are 145 known planets. Taking the earth's direction of revolution as a standard direction, the chance that any one of the remaining 144 planets would have this direction as a result of mere chance is of course one half, since a planet must revolve in one of two ways. Therefore, by the laws of probability, the chance that all the 144 other planets would revolve in that direction is represented by a fraction whose numerator is unity and its denominator 2 raised to the 144th power. Now 144 times the logarithm of 2, (or $\cdot 3010300$) = $43\cdot 3483200$, showing that the above mentioned denominator is a number of 44 digits, beginning 2230077 with 37 digits to follow. This inconceivably enormous number represents the odds to 1 against the observed arrangement being the result of chance, even considering only one relation out of several mentioned above, all of which present the same order of antecedent improbability. Thus Laplace was led to his conception of a vast rotating nebulous disk, from the gradual contraction of which, and the consequent throwing off of rings, breaking up into globes, all revolving and rotating in one common direction and nearly in the same level, the solar system was formed. This hypothesis, however, does not explain the distribution of the masses of the solar system; one planet (Jupiter), for example, containing nearly $\frac{2}{3}$ of all the matter outside the sun, and Saturn and Jupiter together containing about $\frac{1}{12}$ of all that matter. Accordingly, the present writer has suggested a modification of it, in which, starting from some such primary condition as that assumed by Herbert Spencer, the various parts of the solar system were formed by processes of aggregation such as are still going on (though now with extreme slowness). For the motions of the flocculi of Spencer (or of the parts, whatever their nature, from which the system was to be formed) would be more and more rapid with proximity to the central aggregation, according to well known dynamical laws. Accordingly, subordinate aggregations would form with difficulty close by the sun; and hence we can understand the smallness of the

members of the interior family of planets, comprising Mercury, Venus, the earth, and Mars. Again, with extreme distance from the centre, the gravity of available material whence aggregations could form would be so far reduced, that for that reason the planets so formed would be smaller. Hence we can understand why Uranus and Neptune are so far inferior to Jupiter and Saturn. These two giant orbs are thus seen to occupy the space where the conditions were most favorable to the rapid development of subordinate aggregations. In this intermediate region there was abundance of material while yet the motions were not so rapid that a subordinate aggregation could not readily master, so to speak, the matter rushing past toward the aphelion of its orbital motion round the sun. The theory also explains well the existence of a zone of discrete bodies next within the path of Jupiter, that is, in a region disturbed at once by his attraction and that of the sun.—It is not improbable, as remarked in the article METEOR, that the study of cometic and meteoric astronomy may before long throw considerable light on the question of the evolution of our solar system, and enable us to form a nebular hypothesis on safer grounds than those on which the theories in vogue are based. (See supplement.)

NECHO, or **Neco** (in the Bible also Pharaoh Necho, and in the hieroglyphics *Neku*), an Egyptian king of the 26th dynasty, who reigned, according to Rawlinson, from 610 to 594 B. C. He is called by Herodotus the son and successor of Psammetichus I., whose northeastern conquests he followed up with energy. He built a navy for the prosecution of maritime discovery, and began a canal to connect the Nile with the Arabian gulf, but is said to have abandoned this work because warned by an oracle that it would be used for the invasion of his country. Under his directions the Phœnicians circumnavigated Africa. He marched into Assyria to attack the Babylonians, and on his march defeated Josiah, king of Judah, in the valley of Megiddo (about 609). Advancing to the Euphrates, he took Carchemish and established a garrison there. On his homeward march he deposed Jehoahaz, king of Judah, putting his brother Eliakim or Jehoiakim into his place, as a vassal of Egypt; and it is thought that about this time he took Jerusalem. Herodotus says that he took a city named Cadytis, but its identification with Jerusalem is not certain. Three years later Carchemish was attacked by Nebuchadnezzar, and Necho having marched to its relief was defeated and lost all his Asiatic dominions. He never recovered from this blow, the rest of his reign being distinguished only by a weak and irresolute attempt to prepare for a new war against Babylon.

NECKAR, or **Necker**, a river of Germany, tributary to the Rhine, rising in Würtemberg E. of the Black Forest, near Schwenningen, on the frontiers of Baden, at an elevation of more

than 2,000 ft. above the sea. It first flows in a N. direction, crossing Hohenzollern, then N. E. and N. through Würtemberg, and finally N. W. through Baden, joining the Rhine at Mannheim. Its chief tributaries are the Enz, Kocher, and Jaxt. The principal places on its banks are Tübingen, Canstatt, near Stuttgart, Heilbronn, Heidelberg, and Mannheim. The entire length of the Neckar is about 250 m., and it is navigable nearly to Canstatt for small craft and to Heilbronn for steamers. The Neckar is remarkable for its lovely scenery, and excellent wine is produced along its shores.

NECKER. I. Jacques, a French statesman, born in Geneva, Switzerland, Sept. 30, 1732, died at Coppet, in the same country, April 9, 1804. After receiving a liberal education, he went to Paris at the age of 15, was employed as a clerk in a banking house, became a partner in the banking house of Thelusson, and afterward engaged in the same business alone. Having accumulated a fortune, he gave up business in 1764, and was appointed resident minister of Geneva at the court of France. From 1764 to 1770 he acted as syndic of the French East India company. His reputation was greatly increased by several publications, such as the *Éloge* on Colbert, to which the French academy awarded a prize, and an *Essai sur la législation et le commerce des grains* (1775); and in 1776 he was appointed assistant to the comptroller general Taboureaux, with the title of director of the treasury, and in 1777 director general or minister of finance. These appointments he accepted on condition that he should receive no emoluments. He introduced order and economy into that branch of the administration, restored confidence among capitalists by securing the payment of interest on loans, restrained the prodigality of the court, curtailed the expenses of the administration, reclaimed many public estates which had been unlawfully alienated, regulated the assessment of taxes, abridged the right of mortmain, established a uniform excise on salt all over the kingdom, and endeavored to suppress statute labor and tolls. He introduced improvements in the government of several provinces, and assisted in establishing the *mont de piété* of Paris and a bank of discount, out of which subsequently grew the bank of France. By his management a deficit of over 24,000,000 livres was made up, and in less than five years the annual receipts were 10,000,000 in excess of the annual expenditures. In 1781 he published his *Compte rendu au roi sur les finances de l'état*, an exposure which aroused the enmity of the courtiers, whose pensions and privileges had been abridged, and displeased the prime minister Maurepas. Necker, desiring to vindicate his measures before the king, insisted upon a seat in the royal council, from which he had been excluded on account of his religious persuasion. His claim being disregarded, he sent in his resignation. After his retirement he was involved in a

controversy with Calonne, who attacked his financial policy. In 1784 he published his *Administration des finances*, which was sold to the number of 80,000 copies in a few days. When his successors, Joly de Fleury, Calonne, and Loménie de Brienne, had exhausted all available means and brought the exchequer to a crisis, Necker was recalled by Louis XVI., and his return to power, Aug. 25, 1788, was hailed with general applause; confidence at once revived among all classes, and stocks rose 30 per cent. in a single day. But it was not a mere financial reform that was now needed; a political revulsion was at hand. Necker, relying upon his popularity, flattered himself that he could control the revolutionary movement; but from the beginning he acted timidly. The assembling of the states general had been promised by his predecessor, and he had to fulfil that promise. In opposition to the notables who insisted upon preserving the ancient mode of holding the states, he procured an order in council allowing the third estate a number of delegates about equal to that of the nobility and clergy combined. On the opening of the states general he made a report upon the condition of France, full of good wishes for the public welfare, but almost devoid of practical suggestions. After the royal session of June 23 he advised Louis XVI. to order the deputies of the nobles and the clergy to join those of the third estate. He was looked upon by the people as the staunchest supporter of their rights; but on July 11, 1789, he was dismissed by the king and secretly left France. Paris rose at once in the wildest excitement; his bust, with that of the popular duke of Orleans, was carried in a mourning procession through the streets; an insurrection was organized, and on the 14th the Bastille was taken. The king, yielding to popular clamor, sent immediately for his exiled minister, who was reinstated in office after an absence of 18 days. All the sources of public revenue were exhausted, and he had to provide for daily necessities. A loan for 30,000,000 livres and another for 80,000,000 were proposed by him and voted by the constituent assembly on Aug. 9 and 27; and both failed. In this extremity he moved (Sept. 24) that a tax amounting to the fourth part of all incomes should be levied, and the assembly granted it. This was the last financial measure he proposed. He vainly tried to oppose some of the revolutionary measures originating in the constituent assembly, such as the seizure of church property and the issuing of *assignats*. This made him unpopular, not only with the revolutionists, but with the majority of the deputies; while on the other hand he had lost the confidence of the king and of his colleagues. A new issue of *assignats* to the amount of 800,000,000 having been ordered by the assembly (Sept. 4, 1790), he resigned and started for Switzerland. On the roads where a year previous he had been welcomed as the saviour of France, he was in-

sulted, threatened, and even arrested; an order from the assembly was necessary to procure his release. He retired to his estate of Coppet, near Geneva, where he wrote a vindication of his conduct, *De l'administration de M. Necker, par lui-même* (1791). In 1792 he published *Réflexions offertes à la nation française en faveur de Louis XVI.*, which had no other result than to cause him to be placed upon the list of *émigrés*. In 1796 he published an essay, *De la révolution française*, in which he severely censured the directorial government. After the accession of Bonaparte to power, Necker dreamed of the possibility of becoming his minister of finance; but in an interview he was coldly if not disdainfully treated. In consequence he published (1802) *Dernières vues de politique et de finances*, directed against the consular government. Among his miscellaneous writings are: *Le bonheur des sots* and *Fragments sur quelques usages de la société française* in 1786, both humorous; *Du pouvoir exécutif dans les grands états*, a political essay (1791); and *Cours de morale religieuse* (1800). His *Œuvres complètes* (17 vols. 8vo) appeared at Paris in 1822. **II. Susanne Curchod de Nasse**, wife of the preceding, born in Geneva in 1739, died at Coppet in May, 1794. She belonged to a French Protestant family, who on the repeal of the edict of Nantes took refuge in Switzerland. Her father, a clergyman, gave special attention to her education; and she was early noticed for her solid and versatile knowledge no less than her beauty and virtue. The historian Gibbon sought her in marriage, but desisted in consequence of his father's opposition. Having married Necker in 1764, she accompanied him to Paris, where her house soon became the resort of most of the distinguished writers of the time. Buffon, Saint-Lambert, Marmontel, and Thomas were among her most frequent guests; and in this society she educated her daughter, the celebrated Mme. de Staël. She was much occupied with acts of benevolence, and was the founder of the hospital which bears her name (1778). In 1794 she published her *Réflexions sur le divorce*, an elaborate plea for the indissolubility of marriage. A selection from her writings (*Mélanges*) was published by her husband after her death in 5 vols. 8vo.

NECROMANCY (Gr. νεκρομαντεία, from νεκρός, dead, and μαντεία, divination), the art of obtaining knowledge of future events by consulting the spirits of the dead. From the treatise of Tertullian *De Anima* it appears that the common practice of necromancy in his day consisted in eliciting an oracular response from a dead body. It is generally thought, however, that the term necromancy anciently designated the evocation of departed spirits, and "necyomancy" (Gr. νεκυομαντεία, from νέκυς, a corpse, and μαντεία) a descent into the abode of the dead. This latter form of divination is a favorite one with epic and dramatic poets of every period; but no trace of it exists outside

of their fictions. On the other hand, necromancy or the calling up of the dead appears to have been a practice and a profession from the earliest historical times. In Greece the necromanteum (*νεκρομαντεῖον*) was a place consecrated to the performance of necromantic rites. There were several such places, as the cave of Trophonius in Boeotia, the banks of the Acheron in Epirus inhabited by the Thesprotians, various localities in Thessaly, Hierapolis in Phrygia, and wherever the Cabiric associations prevailed in the East or West, Heraclea on the Propontis, and the shores of Lake Avernus in southern Italy. It has been conjectured, from Deut. xviii. 10, 11, that there were also many in Palestine and the neighboring countries, while Endor is indicated in 1 Sam. xxviii.—The most ancient Greek poets devote to necyomancy or the descent into Hades some of their most remarkable compositions, thence called *νεκυσίαι*, their counterparts being termed *νόστοι*, "returns." Homer, Hesiod, Æschylus, Euripides, Aristophanes, and Lucian among the Greeks, and Virgil and Seneca among the Romans, employ necyomancy as a principal part of their machinery, and some of them devote whole poems exclusively to it. Horace in satire 8, book i., and Lucan in his *Pharsalia*, describe forms of evocation. The calling up of Samuel by the witch of Endor, and of Melissa, queen of Corinth, at the instance of her husband Periander, are the first instances of necromancy mentioned in history. It is commonly admitted that its practice was frequent in all known countries at the dawn of Christianity. Tertullian, in the treatise mentioned above, discusses in the light of Christian revelation the prevailing pagan practice of necromancy and the belief underlying it. He speaks of dead bodies reanimated by demons and delivering oracles through the magic arts of sorcerers, as well as of the evocation of departed spirits. This demoniac agency, he contends, was employed by the Egyptian magicians, Simon Magus and Elymas, to deceive the multitude; and he maintains that this same agency was employed by the witch of Endor. He concludes by asserting that it is the exclusive prerogative of the Creator to recall the departed soul to its body; and that similar prodigies performed by demons are mere illusions. Necromantic practices were forbidden under severe penalties by Constantine; and, as forming a part of the magic art, they had been rigorously proscribed under the republic and the pagan emperors. They were half encouraged and half censured by Julian the Apostate, who reproached the sick Christians with sleeping near the monuments of the martyrs in the hope of having a remedy for their ills revealed to them. The professional necromancers (*ψευχαγωγοί*) continued to be proscribed by the successors of Julian, as well as by the canons of the western and oriental churches. Of the practice of necyomancy among the pagan northern nations, we have one striking indication in the Sæmun-

dic Edda, in which is narrated the descent of Odin to the Scandinavian hell in order to consult the prophetess Angarbodir.—In the practice of necromancy, founded as it is in the belief of a future life in which the departed spirits preserve their identity and associate with each other, while holding a certain communion with their living kindred on earth, certain ritualistic forms have been handed down from age to age with slight or no substantial variation. The poetic forms of the necromantic ritual, reflecting more or less truly the national belief of the writers, are to be found in the Odyssey of Homer, books x. and xi., the "Frogs" of Aristophanes, the "Persæ" of Æschylus, the "Menippus" or "Necyomanteia" of Lucian, and from Virgil, Lucan, and Horace as above quoted. It is said that colleges of the necromantic art existed in Spain throughout the middle ages and as late as the 16th century; but absolutely nothing deserving to be considered as fact can be gathered from contemporary authors. The reports made to the inquisitorial courts, or said to be gathered from their archives, are found upon close examination to be unworthy of serious belief. That necromantic and other magical practices always existed in some localities in every Christian land, is probable; but that the rites, forms, and incantations attributed to necromancers, and printed in various compilations, are genuine, cannot be regarded as proved.

NECROSIS (Gr. *νέκρωσις*, from *νεκρῶν*, to cause to die), a term employed to denote the death or mortification of bony tissue. It bears the same relation to the bones that gangrene does to the soft parts; the part of the bone affected with necrosis becoming a foreign body, like the eschar in gangrene, which, by the efforts of nature or of art, must be removed. Necrosis is the result of inflammation of bone (ostitis), caused by injury or arrest of nutrition; it frequently follows ill-treated or badly performed amputations, and is more apt to occur in scrofulous and debilitated subjects. (See AMPUTATION.) Inflammation of bone does not, however, always end in necrosis; for resolution may take place, or superficial suppuration. The bones of the lower extremity, particularly the femur and tibia, are those most frequently attacked, although persons engaged in making lucifer matches, or otherwise exposed to the fumes of phosphorus, often have necrosis of the jaw bones. (See MATCH.) Necrosis may be traumatic (from mechanical injury) or ideopathic (without immediate exciting cause); and the inflammation from which it arises may be either acute or chronic. The progress of the necrosis itself (that is, the separation of bone) is more or less slow. The extent varies; sometimes a mere leaf of bone may perish on the external surface, a process termed exfoliation; or a large exterior section or the cancellated interior may perish. (See BONE.) The dead portion is called a *sequestrum*, its position depending upon whether the ne-

crosis is external, from periostitis, or internal, from endostitis. (See OSTEO-MYELITIS.) Necrosis usually attacks the laminated structure of the shaft rather than the cancellated or spongy portion, this being more liable to caries. (See CARIES.) By avoiding the articular extremities, therefore, necrosis is not apt to be complicated with synovial inflammation, but it occasionally attacks the head of the tibia. Its progress may be divided into two stages, the inflammatory stage and the stage of separation, the latter taking place when the inflammation reaches the point of suppuration. When the necrosis is external to the shaft, the periosteum, when not destroyed, generally secretes a shell of bone outside of the dead part, and through holes in this the pus passes out. When the inflammation is in the membrane of the canal, or endosteum, and is followed by necrosis, the sequestrum will be surrounded by a shell of the true shaft.—The symptoms of necrosis are those of inflammation of bone in general, attended by other distinguishing physical signs, such as whiteness of the exposed bone, resonance on being struck, and absence of hæmorrhage if scratched. If, however, the bone retains its vitality, the color is brown, it is covered with a secretion of its own, and it bleeds when scratched. The treatment is both expectant and active. Time, pain, and much suffering may be saved by an early and free incision into the diseased part. The detachment of the sequestrum must be left entirely to nature, or assisted only by constitutional treatment, such as leeches, fomentations, and other local antiphlogistic, but often general tonic treatment, great attention being paid to supporting the strength. When the sequestrum has become wholly detached from the living bone, nature should be assisted in its removal by art. There is error in waiting too long, as the irritation of the dead part may induce too much structural change; but there is greater danger in interfering too soon, before the piece of bone becomes loose. When a careful examination has indicated the proper time, an incision is made through the superficial soft parts; then, through the cloacæ in the exterior shell of bone formed by the periosteum, the form and position of the sequestrum may be ascertained with a probe. If necessary the exterior shell must be divided by cutting pliers, and an opening sufficiently large made to admit of extraction by the forceps, which must be carefully and gently done. Amputation is sometimes required.

NECTAR, in Greek and Roman mythology, the beverage of the gods, imparting health, vigor, youth, and beauty to all who drank it. It is described as a red wine, which like that of mortals was drunk mixed with water. It was served at the banquets of the immortals by Hebe or Ganymede. According to a few ancient writers it was the same as ambrosia, being not the drink but the food of the gods. In the Iliad, Thetis is represented as preserving

the body of Patroclus from decay by anointing it with both ambrosia and nectar.

NECTARINE (Ital. *nettarino*). When the nectarine was introduced into cultivation, or whether it was known to the ancients, is not ascertained. It is simply a peach with a smooth skin (see PEACH), and nectarines have been raised from peach stones and *vice versa*. As early as 1741 Peter Collinson, in his correspondence with Linnæus, cited the case of a peach tree producing nectarines, an occurrence which has frequently been noticed in this country as well as in Europe; and one instance is recorded in which a nectarine tree at first bore fruit half nectarine and half peach, and subsequently bore a perfect peach. The Boston nectarine, one of the esteemed varieties, is known to have been raised from a peach stone. As with peaches, there are free-stone and cling-stone nectarines. In quality the nectarine is not so rich as the best peaches, but its flavor is distinct, and frequently strongly marked with the bitter-almond or prussic-acid flavor; but no fruit exceeds it in beauty, the wax-like skin being often of the richest shades of yellow and carmine. Something over 30 varieties are in the fruit catalogues, differing in size, color, time of ripening, &c. The Elruge and Violette Hative are the varieties most generally cultivated, the popularity of the latter being shown by its having about 15 synonyms. So far as climate is concerned, the nectarine will succeed wherever the peach will, but it is much less seen in our gardens than formerly on account of the destruction of the fruit by the curculio; its smooth shining skin seems to offer an especially tempting place for the female curculio to deposit her eggs; by systematic jarring of the trees, as practised with the plum, a good share of the fruit might be saved. Under glass the nectarine reaches great perfection, and there are few finer sights in horticulture than a nectarine house in full bearing, at the time the fruit is ripening.

NECTARY (*nectarium*), the term applied by Linnæus to the parts of the flower in which nectar or honey is secreted. It was afterward used for any anomalous appendage to the flower, or for any unusual development of its parts, such as the spurs of the calyx in columbine and the curiously modified petals of the acornites; it was also given to the cup which surrounds the stamens in *narcissus*, to various disks and glands of the flower, and in fact to all parts of the flower not properly referred to calyx, corolla, stamens, and pistils. Having become such an indefinite term, being applied to bodies of widely different nature and without regard to whether they secreted honey or not, it has of late years been dropped by the best authors, and may be regarded as obsolete.

NEJDJED, or *Nejd*, a country of central Arabia, the dominion of the sultan of the Wahabees, between lat. 19° 20' and 29° 30' N., and lon. 40° 10' and 50° 20' E., bounded N. by Shomer, E. by the Persian gulf, W. by Hedjaz, and S.

by the Dahna or great sandy desert; pop. in 1862, according to Palgrave, 1,219,000. The country is divided into 11 provinces, and the population is distributed in 316 towns or villages. Nedjed is traversed from N. E. to S. W. by a range of mountains called Jebel Toweik, whose general form is that of a crescent. It is a wide and flat chain, or rather plateau, with an elevation of from 1,000 to 2,000 ft. above the surrounding country, or about 3,000 ft. above the sea. The extreme verge is generally abrupt, the chalky cliffs rising from the plain 500 or 600 ft. Then succeeds a table land, nearly level; then another steppe of 300 or 400 ft., followed by a second table land; and occasionally a third and loftier one crowns the whole. The entire plateau is intersected by numerous valleys of various breadth and length, but nearly all of which are bordered with steep and sometimes precipitous banks. The plateaus are for the most part clothed with fine pasture, which lasts throughout the year; but the greater the elevation, the less is the fertility and the drier the soil. Trees, solitary or in groups, are common. Little water is to be found, the torrents that pour down the cliffs in winter being soon absorbed. In the valleys the underground supply is constant and copious. Jebel Toweik is of calcareous formation, and not granitic like the mountains of Shomer, although in the south-east peaks of granite are intermixed sometimes with the limestone rock. Iron ore is found in the W. part of the range. The soil of the valleys is light, a combination of marl, sand, and little pebbles washed down from the heights. In these valleys are concentrated the fertility and the population of central Nedjed. The climate of the N. part of the range, where the mountains are the highest, particularly in the province of Sedeyr, is as healthy as any in the world, and the inhabitants are remarkable for their ruddy complexions and well developed forms. The principal towns of this province are Atalah and Toweym, the latter having 12,000 inhabitants. West of Sedeyr lies Woshem, the chief town of which is Shakra; and S. of it are Aared and Yemamah, in the former of which is Riyad, the capital of Nedjed. Throughout this central region there is abundant pasture, and the sheep, camels, horses, and cattle excel those in other parts of Arabia. There is a broad-tailed breed of sheep, yielding good mutton and remarkably fine wool. Camels abound, and dromedaries are more frequently seen than in Shomer. Cows and oxen are common, of a prevailing dun color, small-limbed, and having a hump like the cattle of India. The horses are the perfection of the Arab breed, but are not common, for none but chiefs or men of wealth and rank possess them. They are small, but of exquisite shape, and generally of chestnut or gray color. Wild boars and pigs are sometimes seen in the mountains, and gazelles are numerous. Game is abundant, especially of the feathered kind, such as par-

tridges, quails, and pigeons, but is seldom hunted. There are no venomous insects, and flies are almost unknown.—On the N. boundary of Nedjed, on the borders of Shomer, is the province of Kasim, separated from central Nedjed by a *nefood* or sand pass, stretching from N. E. to S. W., and almost impassable in the hot months. Kasim is a large plain, about 60 m. in width and twice as much or more in length, studded with towns and villages, towers and groves. Besides four or five large towns and more than 50 villages, its surface is strewn with smaller hamlets and isolated wells and gardens, connected with each other by a maze of paths and tracks. From here to Jebel Toweik extends a series of high watch towers, that afford the means of discerning the approach of invasion. The soil, a red or yellow sand, gives little promise to the eye, but wherever irrigated produces a rich vegetation. Water is abundant. The date palm is the staple article of cultivation, but the peach, apricot, fig, and grape are also raised. Cotton grows well, but none is raised for export. An important commerce was once carried on between Kasim and Damascus, but it has ceased to exist under Wahabee rule. The principal walled towns of Kasim are Bereyдах (pop. 25,000), and Oneysa (30,000). Hasa, another province of Nedjed, lies on the Persian gulf. Its N. part constitutes the province of Katif, but the two are considered as one district by the government. The chief town is Hofhuf. Katif, the principal seaport of Nedjed, about 80 m. N. by E. of Hofhuf, was once a place of considerable commerce, but the neighboring island of Bahrein, in the dominions of the sultan of Oman, has absorbed most of its trade. The vegetation of Hasa differs in many respects from that of central Nedjed. The date palm still predominates, but the *nabak*, a mere bush inland, becomes here a stately tree. Indigo is cultivated, and cotton is more widely grown than in Yemamah or Kasim; rice fields abound, and the sugar cane is raised. Almost all the leguminous plants and the cereals, barley excepted, grow to perfection, and under a different government could be raised with profit; but heavy taxes and arbitrary contributions have ruined agriculture. Hasa was once noted for its manufactures. Its cloths of silk and wool mixture, of a delicacy of work and elegance of pattern unknown elsewhere save in Cashmere, and its embroidered cloaks of brilliant colors, bordered with gold and silver threads, were famed in the eastern world. Its artisans in the precious metals, copper, and brass were unrivalled. But Wahabee fanaticism and proscription of all luxuries has cut off these branches of labor, which once supplied an important commerce. The climate of the coast is not so healthy as that inland, and the people are more sallow in complexion, and have less physical activity. A large part of the remainder of Nedjed is a desert interspersed with occasional oases. The great pilgrim routes from Persia to the holy

cities lie across Nedjed; the more northerly one, to Medina, through the province of Kasim, that to Mecca along the N. base of Jebel Toweik. The caravans are made to pay exorbitant tribute, for the Persians and all others who are not strict Wahabees are regarded as heretics whom it is right to despoil.—Nedjed contains two diverse elements in its population, those who are strict Wahabees in faith and those who are Wahabees by subjection only. The former class predominates in the provinces of Aared, Woshem, Sedeyr, Aflaj, Dowasir, and Yemamah. In the other provinces there is not much attachment to the reigning dynasty, and the people are unsettled in their opinions. Hasa, Katif, and Kasim are subject to Nedjed only because they are unable to free themselves, the majority of the people being Mohammedans, but not Wahabees. The government is a pure despotism. The military muster of the sultanate is about 50,000 men. Two or three miserable vessels at Katif constitute the navy. The annual revenue is estimated by Palgrave at about £100,000, with a nearly equal income from extraordinary contributions, fines, spoils of war, &c.—For the earlier history of Nedjed see WAHABEES. In 1834 Turkey, the sultan of Nedjed, who was actively engaged in reconstructing his kingdom, ruined by the Egyptian invasion, was assassinated by his cousin Mashary, who usurped the throne. Faisul, Turkey's son, returned at once from Hasa, where he had been besieging Hofuf, slew Mashary, and assumed the sovereignty. The Egyptians again overran Nedjed in 1838, and Faisul surrendered to their commander; but in 1843 he returned to Riyad and reestablished himself as the legitimate head of the Wahabees. He died in 1865, and was succeeded by his son Abdallah, against whom his younger brother Turkey successfully revolted. Abdallah, expelled, sought aid from the Sublime Porte, which sent an armed force and in 1874 took possession of Hasa on the east, while on the west another body of troops occupied Lahe, but with what result so far as Nedjed is concerned is not now (February, 1875) known.—See Palgrave's "Journey through Central and Eastern Arabia" (London, 1865), and Pelly's "Visit to the Wahabee Capital," in the "Journal of the London Geographical Society" (1865).

NEEDLE, a slender steel instrument, pointed at one end and with an eye at the other, used for carrying the thread in sewing. Among uncivilized people, at a very early period, rude attempts were made to form needles or bodkins of bone and ivory, by means of which their garments might be stitched together; but among the more refined nations of antiquity, as the Chinese, Hindoos, Egyptians, Assyrians, and Hebrews, fine needles must have been in common use. Pliny mentions needles of bronze for sewing and knitting as being in use in his day, and bronze needles of large size have been found in Egyptian tombs, which must have been made 4,000 years ago. Fine needles could

not of course resist the consuming action of air and moisture for so great a length of time. The Spanish or steel needle was introduced into England in the time of Queen Elizabeth; but the process by which it was made was kept secret, and the art was unknown till the year 1650, when it was revived by Christopher Greening at Long Creden in Buckinghamshire. Great improvements have since been introduced in needle making; and the "fine steel needles" of that period bear but a faint resemblance to the delicate and highly tempered needles of the present time. The manufacture of needles is now carried on to a great extent in many villages in England, but principally at Redditch, about 12 m. from Birmingham, and from this obscure place a large portion of Europe, the British colonies, and the United States are supplied. They are also made at Aix-la-Chapelle and its suburb Bortette, the latter place being the principal seat of the manufacture on the continent.—Though extremely simple in its form and appearance, the needle requires many operations for its construction, passing through the hands of nearly 100 workmen. The wires of various sizes being furnished in coils to the needle maker, he selects such as are of equal diameter and clips them into pieces, each of the length of two needles, with large shears, which are fastened to the wall of the cutting room. After being straightened, they are pointed by applying them to small, rapidly revolving grindstones. The wires being pointed at both ends, the centre of each is flattened, and a groove is formed on either side, with a small indentation at the spot where the eye of the needle is to be made, which operation is performed by means of a stamping machine. A bed of iron which contains the under half of the die or stamp is supported on a heavy stone, the upper half being attached to the bottom of a hammer, of about 12 lbs. weight, which is raised with the foot by means of a lever. The wires are dropped, one at a time, upon the iron bed, and the hammer is made to fall upon them with a sharp blow. The raised faces of the stamp produce indentations on the opposite sides of the wire; and though the operator adjusts each piece separately, yet he can stamp 2,000 wires or 4,000 needles in an hour. The work of eyeing the needles is performed by boys, who use small hand presses for the purpose. The lengths are next separated between the eyes by bending the lines of needles backward and forward. The points then being held firmly in a hand vice, the heads are filed to their proper shape. This completes the soft work, as it is called. The next process is hardening. The needles are now in a black, soft, dingy state; and in order to harden them they are placed on iron plates and brought to a red heat, when they are plunged into cold oil, after which they are again heated to a less temperature and more gradually cooled. The scouring or clean-

ing is accomplished by laying the needles in heaps upon pieces of canvas, scattering them upon a quantity of soft soap, emery, and oil, and rolling them into bundles, which are closely wound with twine. Each bundle is from 2 to 3 ft. long and from 3 to 4 in. thick. These are placed in a scouring machine, which resembles a common mangle, and rolled backward and forward for 50 or 60 hours. The scouring and cleaning is continued for the best needles seven or eight days. When taken out of the canvas they are laid on tin plates, and a little girl is employed to place the heads all one way. This is done simply by wrapping a piece of wash leather around the fore finger, and pressing it against one end of the pile of needles, thus catching all the points which lie in that direction. All the imperfect needles are then removed, the remainder are placed in rows upon metal plates with the eyes projecting over the edge, and a red-hot iron plate is brought sufficiently near to produce a dark blue film upon the heads, which indicates a proper temper. The very delicate operation of drilling, or removing the jagged portions from the interior of the eye, follows. This is performed by a woman who has before her a three-sided steel drill, revolving rapidly. Taking the needles in her hand and arranging them in the form of a fan, she brings them successively under the action of the drill, first on one side and then on the other, after beveling off the sharp edge of the eye where it communicates with the groove, which is called counter-sinking. The drilling of the eye is a modern improvement, and requires a very steady hand. The points are finished upon a small rotating stone, and then polished on a wheel covered with buff leather, slightly coated with polishing paste. Lastly they are counted into quarters of hundreds, folded in colored papers, and labelled. For exportation these are made up into packets containing from 20,000 to 60,000 each. The processes above described apply only to the finer sorts of needles. In the heavier kinds, such as harness, upholsterers', sail, mattress, and bookbinding needles, many of these operations are omitted. The French needles are generally made of iron wire which is converted in the course of the process by cementation into steel. The manufacture by this method is less difficult, but the needles are decidedly inferior to the English.

NEEDLES, The, a cluster of five pyramidal rocks in the English channel, lying off the W. extremity of the isle of Wight. They are composed of thick strata of chalk alternating with very thin strata of black flint. The waves are continually producing changes in their form, and only three of the pyramids now stand prominently out of the water. In 1764 the principal one, which was 120 ft. high, fell down, and almost entirely disappeared.

NEEF, or Neefs, Pieter, the elder, a painter of the Flemish school, born in Antwerp about 1570, died in 1651. He was a pupil of Hendrik

Steenwyck the elder, and like him was distinguished for his excellence in perspective and architectural views. He painted principally the interiors of churches and temples. Many of these views are represented by torchlight. As he was deficient in the designing of figures, he often employed the Francks, Van Thulden, Jan Breughel, or Teniers to paint them; and his pictures decorated by the two last are very valuable.

NEELE, Henry, an English author, born in London, Jan. 29, 1798, committed suicide in a fit of insanity, Feb. 7, 1828. He was the son of an engraver in the Strand, and in early life was articled to an attorney. He published "Odes and other Poems" (1817), "Dramatic and Miscellaneous Poetry" (1823), and "Romance of English History" (1827). In 1827 he delivered a series of lectures on English poetry from Chaucer to Cowper, which were published after his death, under the title of "Literary Remains;" and a volume of "Tales" and other miscellaneous pieces in prose and verse was published in 1830.

NEES VON ESENBECK, Christian Gottfried Daniel, a German botanist, born near Erbach in the Odenwald, Feb. 14, 1776, died in Breslau, March 16, 1858. He was educated at the gymnasium of Darmstadt and the university of Jena, and after practising for a time as a physician was appointed in 1818 professor of botany at Erlangen, and subsequently was elected president of the Leopoldine academy of naturalists. In the same year he was appointed professor of botany in Bonn, where, with the help of his brother and of Sinning, the gardener of the botanic garden, he was the means of founding a new institution for the science. In 1830 he went to Breslau as professor of botany and director of the botanic garden. Shortly before the political commotions of 1848 he became an active member of the newly formed Breslau religious association called *Christkatholiken*, whose aim was to utilize the working power of the congregation by organizing among themselves associations for various benevolent purposes. In 1848 he went to Berlin, where he was active in the cause of democracy, and on his return founded at Breslau a society called the fraternity of laborers for the promotion of their education, domestic comfort, and business relations. The government ordered him to resign its presidency. He was soon afterward prosecuted for living with a woman without having been divorced from his third wife, and in 1851 he was suspended and in the following year deposed from his professorship. His prosecution was generally considered to be merely a pretext in order to interfere with his reformatory labors. He was also a believer in spiritualism, and some of his children were reported to be clairvoyants. For the support of his numerous family, he was obliged to sell his valuable library, and his herbarium, consisting of 80,000 specimens. One of the most distinguished of German botanists, he was hon-

ored with numerous dignities, and was elected a member of 77 learned societies. Goethe, in his "Metamorphosis of Plants," had advanced the theory that the various parts of the flower are all modifications of one common type, the leaf; and this theory Nees von Esenbeck demonstrated to be scientifically true in his *Handbuch der Botanik* (2 vols., Nuremberg, 1820-'21). Among his other botanical works are: *Die Algen des süßen Wassers* (Bamberg, 1814); *Das System der Pilze und Schwämme* (Würzburg, 1816); *Die Pflanzensubstanz*, written in conjunction with Bischof and Rothe (Erlangen, 1819); *Bryologia Germanica*, with 43 colored plates, in conjunction with Hornschuh and Sturm (2 vols., Nuremberg, 1823-'31); *Agrostologia Brasiliensis*, forming the first part of Martius's *Flora Brasiliensis* (Stuttgart, 1829), to which he appended a poem of 16 pages, entitled *De Saccharo Opificio Carmen*; *Enumeratio Plantarum Cryptogamicarum Javæ et Insularum adjacentium* (Breslau, 1830); *Genera et Species Asterearum* (Nuremberg, 1833); *Systema Laurinarum* (Berlin, 1836); *Floræ Africæ Australioris Illustrationes Monographiæ* (Glogau, 1841); and *Systema Hepaticarum*, in conjunction with Gottsche and Lindenberg (Hamburg, 1844-'7). In 1852 he published the first volume of a projected illustrated manual of universal natural history, entitled *Die allgemeine Formenlehre der Natur* (2d ed., Breslau, 1861). He early applied himself to the study of cryptogamous plants, in regard to which his researches were minute and extensive. His great work in this department is the *Naturgeschichte der europäischen Lebermoose*, also known under the title of *Erinnerungen aus dem Riesengebirge* (4 vols., Berlin and Breslau, 1833-'8). In the sphere of speculative thought he published *Die Naturphilosophie* (1841), which he intended as the first part of a "System of Speculative Philosophy."

NE EXEAT. The writ *ne exeat regno* in England, and *ne exeat republica* in the United States, is issued by the court of chancery to restrain a defendant in a pending suit from leaving the country. It is directed to the sheriff of the proper county, and commands the arrest of the defendant and his detention until he shall give security in a sum specified not to depart from the jurisdiction of the court without its permission. The writ is not allowed until after bill filed, nor without a showing under oath both of a good cause of action, and of a threat or design on the part of the defendant to go abroad, by means whereof the purpose of the action may be defeated. It is not often resorted to, and indeed since imprisonment for debt has been almost universally abolished there are only a few cases, such as those of fraud in fiduciary relations, and others standing on like reasons, in which the court could be justified in awarding it. From the foregoing statement that this remedy has become an unusual one should perhaps be excepted the state of New York, in which a

question seems to have been made whether the province of the writ is not extended by the abolition of distinctions between legal and equitable remedies. There is a conflict in the rulings of the courts whether the writ is not abolished by the code, but in the supreme court a very liberal use has of late been made of it.

NEFF, Félix, a Swiss missionary, born in Geneva, Oct. 8, 1798, died there, April 12, 1829. He entered the army, and reached the rank of sergeant, but left the service in 1819 to become a missionary in the valleys of the upper Alps. In 1821-'2 he visited the destitute districts of Grenoble and Mens in France; and in April, 1823, went to England, where he was ordained an Independent minister. He afterward resumed his labors in the Alpine glens, dedicating churches, organizing schools, and aiming incessantly to benefit the people; and the hardships to which he subjected himself finally destroyed his health. His life has been written by A. Bost (London, 1855).

NEGAUNEE, a city of Marquette co., Michigan, situated in the midst of the iron region, at the junction of the Marquette, Houghton, and Ontonagon railroad with the Peninsular division of the Chicago and Northwestern line, 12 m. W. by S. of Marquette; pop. in 1874, 3,741. On the south and west are large hills containing immense deposits of iron ore, and on the N. border is Teal lake, a beautiful body of water 2 m. long by $\frac{1}{2}$ m. wide. There are productive mines and several large blast furnaces within the city limits. Negaunee has a number of stores doing a large business with the surrounding mines, a national and two state banks, a weekly newspaper, good public schools, and three churches. Previous to 1865 it contained only a few cabins.

NEGLIGENCE, in law, primarily the want of care, caution, attention, diligence, skill, or discretion in the performance of an act by one having no positive intention to injure; and secondarily the omission to perform a duty imposed by law for the avoidance of injury to persons or property of others. In the civil law negligence is classed as slight, ordinary, and gross; the first being the want of great care and diligence, the second the want of ordinary care and diligence, and the last the want of even slight care and diligence. The propriety of this classification has often been denied by common law judges; but as the degree of care, caution, and diligence required of parties is different under different circumstances, so that the same want of caution and prudence which under one set of circumstances would render the parties chargeable with it liable as for negligence, would give no right of action under another, the classification is found useful as indicating the different degrees of diligence required by the law in different cases. Thus, if for the mere accommodation of my neighbor I loan to him the use of my horse, for which he is to make no compensation, it is reasonable that he should take the highest care of him,

and that he should respond to me for any damages occasioned by even a slight want of care and diligence; while, on the other hand, if I desire him to keep my horse for me a short time, without compensation and solely for my accommodation, it would be unreasonable to charge him with an obligation for the like extreme care, or to hold him responsible for anything short of serious and culpable neglect. If, however, the bailment is for the mutual accommodation and benefit of both parties, so that he has the use of the horse while I am compensated for it, the just rule would seem to be that he should take such care of the horse as a prudent man would of his own, and that anything short of this, resulting in injury, should be accounted actionable negligence. The rules on this subject have been explained to some extent in the article BAILMENT, and the liability of an employer for the negligence of his servant is stated in that on MASTER AND SERVANT. In general, any person guilty of negligence in the exercise of his rights, or failing in due time and manner or with due care to perform a duty, whereby another person sustains injury, is responsible to the party injured for the consequent damage. Thus, if an attorney undertakes the management of a suit, but neglects to file pleadings in due time, or to attend at the time fixed for trial, or to produce in evidence the documents in his possession proving his client's right, and his client loses his suit in consequence, the injured party by the proper action, counting on this negligence, may recover compensation for what he has suffered thereby; and if a railway company, owing a duty to the public to propel its trains with caution and prudence through a village or any thickly settled neighborhood, shall run them with great rapidity and without signals, by means whereof persons passing along the streets and themselves observing ordinary caution are struck by the train and injured, such persons may have redress in a like action. The chief qualification of this doctrine is that the party complaining of the injury must not himself have contributed to it by his own wrongful or wilful act, or by his own want of ordinary care; for if both parties were in fault, the common law will not attempt to apportion the culpability, but will leave each party where his own unwarrantable conduct or neglect has left him. In this regard the rule of the common law is different from that which prevails in admiralty in some cases, where the consequences of the concurring fault of two parties may be apportioned between them as near as shall be found practicable. The concurring fault or negligence, however, which at law will bar an action for redress, must be such as has contributed proximately to the injury. Thus, if one drives across a railroad track without looking to the right or left, and is struck by a passing engine, he can have no redress, because he failed of ordinary prudence in not looking to see whether a train

was near; but if, observing due care and prudence at that time, he is nevertheless injured, it will be no defence to the railway company that some want of proper caution may remotely have contributed to the accident. The rule of contributory negligence imputes to one who is under natural or legal guardianship the negligence of the guardian; so that a child run over in the street may not recover damages from the party accidentally running over him, if the parent who had charge of him was careless in permitting him thus to wander into a place of danger; and an insane person may not recover where the trustee negligently suffers him to be abroad. And this rule is applicable where one temporarily places himself in the hands or under the control of another; as where one takes a seat in the carriage of another and is carelessly driven by the latter into danger, the negligence of the driver will preclude recovery for accidental injuries. Corporations as well as natural persons are liable for negligence, and municipal corporations as well as others, with this restriction, that an exercise of their legislative authority is not imputable as negligence. But if the corporation order the construction of a public work, and the execution of the work is careless and imperfect, and injury results, an action will lie, provided it is constructed by the corporation itself through its own agents; but if the construction is let to an independent contractor, he alone can be looked to for redress for his negligence. Public officers are in general liable for their negligence, not only to parties on whose behalf they assume to perform a duty, but also to third persons injured by their action; but from this must be excepted the chief executive of the nation or state, any officers while acting in a legislative capacity, and judicial officers and others exercising a discretionary authority, and where the negligence is predicated of their discretionary acts. The owner of a vicious beast, knowing him to be such, is guilty of negligence if he suffers him to be at large without a keeper; but as his liability at the common law depends upon his knowledge of the vicious nature of the animal, which is not always easy of proof when it exists, it has been thought proper in some cases, especially as regards dogs, to pass statutes dispensing with this proof, and making the owner liable upon proof of the injury alone.—Where negligence results in the death of a human being, the common law gives no remedy; but this has been found a great hardship, which was remedied in England by statute in 1846, and the substance of this statute has been reenacted in the several states of the Union, the remedy being given to or for the benefit of the parent, husband, wife, child, or estate of the person killed. The killing of a person by wilful neglect or gross carelessness may be a felonious homicide; as where a mechanic throws rubbish from a roof into the streets of a village where people are constantly passing, with-

out looking to see if at the time it is clear; or where the engineer on a railway train drives it furiously through a town without sounding signals, or occupies the track in the time of an approaching train without taking steps to ascertain whether he may do so with safety. If in any of these cases death results from the negligence, the reckless and wanton conduct will stand for criminal intent; and in any case of a clear duty imposed by law, if death result from a neglect of the duty, it will be accounted criminal homicide. (See *HOMICIDE*, and *MANSLAUGHTER*.)—The legal aspects of negligence have recently been fully considered in the valuable treatises of Shearman and Redfield (New York), and Francis Wharton (Philadelphia).

NEGOTIABLE PAPER. In the article *EXCHANGE, BILL OF*, some of the general rules of the law of negotiable paper have been stated. In explanation of the central principle and foundation of this very peculiar system of law, we will briefly consider its origin and history. The earliest commerce must have been by barter, and therefore limited to the exchange of superfluities between neighbors. Then money was invented and used as the representative of all value and all property; and he who had anything to spare could exchange it for money, in which its value was vested, and this value could be retained by him who held it until he wished to exchange it for something he needed to use. It was an immense step thus to obtain a representative of all value; and the utility of it grew with the increasing commerce of the world, and was found adequate to the wants of this commerce until a few centuries ago, when the next step was taken, and something was found which is the representative of the representative of all value; and to this last invention the enormous increase of commerce since it came into use must be ascribed. As a bag of coin represented the value of 100 oxen, now a strip of paper represents the value of barrels of gold. But while the principal benefit of negotiable paper is due to the fact of this perfect representation of all value, there are two other utilities attached to it of almost equal importance. One of these is the facility it offers for paying distant debts without transfer of money or property, by making debts in one place pay debts in another, through the instrumentality of bills of exchange. The other is the method it offers of accumulating credit and employing the whole mass as money by means of successive indorsements. The origin of bills of exchange has been accounted for on various theories, each having perhaps some basis in truth; but when it has been stated that some six centuries ago they came into general use in Europe, little more can be said with certainty. Negotiable notes were not used until much later, and not until the statute of 3 and 4 Anne, ch. 9, which enacted that they should be "assignable and indorsable over in the same manner as inland

bills of exchange are or may be by the custom of merchants," was their negotiability fully recognized by the courts. In the article already referred to the chief incidents of negotiability were explained, namely: that when the paper is duly assigned the assignee is entitled to maintain suit upon it in his own name, and also may recover the sum promised to be paid by it notwithstanding there might have been defences to it in the hands of the assignor which would have precluded a recovery by him. Let us see, then, of what paper this quality of negotiability may be predicated. In the first place, independent of statute or of recent usages (which we shall refer to further on), it must be either a bill of exchange or a promissory note, which instruments are sufficiently explained under those heads. In the next place, if a bill of exchange, it must direct the person upon whom it is drawn to pay the sum of money therein specified to a person named (who is then called the payee), or to his order; and if a promissory note, it must promise to pay the sum specified to some person named or his order, or it may promise to make payment to the bearer, without naming any person whomsoever. In the case last mentioned the note is in contemplation of law payable to any one who may lawfully become the owner thereof, and it is assigned from hand to hand by mere delivery, and any person receiving delivery on a purchase thereof may enforce payment as bearer. With a bill or note payable to the order of a person named it is different. Before it has been assigned or negotiated only the payee can demand the money or bring suit; but the payee may assign it by writing his name upon the back, which is called an indorsement, and by delivering it to the intended assignee. There are several methods of making this indorsement, and one or another will be resorted to according to circumstances. If nothing more is written upon the back of the paper than the indorser's name, this is called a general indorsement, and it is equivalent in legal effect to a direction to the drawee or maker to pay the bill or note to the bearer thereof. The disadvantage of this is that in case the paper should be lost or stolen the finder or thief would have upon it the evidence of a *prima facie* right to receive and collect the money, and he or his assignee, under the rules laid down further on, might actually succeed in making collection to the exclusion of the real owner. To guard against such possible consequences, the payee in assigning may order the payment to be made to a person named, thus: "Pay A. B. or order;" and this being signed by him and delivered to A. B., who is thus made indorsee, the paper is payable to the indorsee only so long as he does not order it paid to any other person; but if he by a like indorsement shall order it paid to the order of another person named, the latter, until he shall give a similar order, becomes the only person entitled to demand and receive

payment. In this way the paper may pass through many hands, and be the instrument of many payments; and the owner for the time being will be always protected against the consequences of a loss of the instrument, because so long as he keeps it the indorsements will show that he alone has legal right to the money. In either of these forms of indorsement the indorser is held to undertake to make payment of the bill or note to the legal holder, provided the drawee or maker does not meet it when due, and the indorser is duly notified of the dishonor; and if there are several indorsers, the undertaking of each is the same. To avoid this, the indorsement may be without recourse; that is, the indorser in writing his name upon the paper may write over it "without recourse," or any other words indicating that he is not to be looked to for payment in any contingency. This does not affect the negotiability of the paper, but is only to shield the indorser from personal responsibility in case the drawee or maker fails to make payment. In order to understand the advantages to the holder of negotiable paper to be derived from this quality, the position of the holder may be compared with that of the assignee of other rights in action. Suppose, for instance, that one shall give his creditor a paper in these words: "Due A. B. five dollars, payable on the first day of January next," dated and signed by him; this paper is not negotiable, because it is payable only to A. B., and not to his order or to the bearer. If this paper is sold by the payee, and suit is brought upon it, this must be in the payee's name, as already stated. But it may be that when thus sued the maker will set up some defence to it, as that it was obtained by fraud, or without consideration, or that it has been paid; and such defence would be equally good against the paper in the assignee's hands as it would be were the payee still the owner. On the other hand, suppose the paper to be a promise to pay five dollars to A. B. or order on the first day of January after its date; in this case, if A. B. sells the note and indorses and delivers it, the assignee may not only sue upon it in his own name if it is not paid at maturity, but if it was indorsed to him before it fell due, and he paid value for it in good faith and without notice or knowledge of any defence to it, he may enforce payment regardless of any such defence, though it might have been one that was perfectly good as against the payee himself. In this respect negotiable paper is placed on the footing of money. If a man loses his watch, or is robbed of it, and the finder or robber sells it for value to an innocent purchaser, who sells it to another, and he to another, and so on, the owner can take it wherever he can find it, for no buyer acquires the slightest property in it against the owner. But if a man loses or is robbed of gold coins, and the finder or robber pays them away to an innocent party in the pur-

chase of goods, the owner loses his money. He cannot reclaim it unless by proof that the receiver of it knew when he took it that it belonged to some one other than the holder. Now this is precisely so in relation to promissory notes or bills of exchange, payable to order or to bearer. A familiar example may be found in bank notes, which are only promissory notes payable to bearer, and which stand exactly on the footing of coined money, in that any one receiving them innocently for value holds them against any original owner. If we require the reason for this doctrine, it is that negotiable paper may become the adequate instrument of business, as the word negotiable implies; and for this end, that it may represent money, and take the place of money, and possess in all the transactions of business all the immunities and privileges of money. If we understand clearly this principle and purpose of negotiable paper, or rather of the rules of law in relation to negotiable paper, we shall be able to understand those rules. It is for this purpose that all those rules aim at giving to negotiable paper the certainty of money; at making it tell its own story as money does; and, in a few words, at enabling every person who holds it to use it precisely as he would use money, with the additional advantage that he may by his indorsement add his own credit to that which the paper already holds.—The chief rules governing negotiable paper may be here stated. No especial form is necessary to either a bill or a note. The essential things are, a distinct promise, and sufficient certainty as to the payee, the payer, the amount, and the time of payment. The paper may be payable to any body or number of persons, if sufficiently designated, as "to the executors of A. B.," &c.; but if payable "to A. or B.," it is bad for want of certainty. It must be payable in money and not in property; and in England it has been decided that paper payable in bank of England notes was not negotiable, because such notes were not money. Similar decisions have been made in some of the states, while in others it is held otherwise if the paper is payable in what passes current as money at par. It is not to be inferred from what has been said that those only can be indorsers to whom or to whose order the paper has been made payable; any number of persons may indorse paper in order to charge themselves contingently with its payment under the rules given further on.—As soon as negotiable paper has been dishonored, or is over-due, it loses almost the whole of its peculiar character, and what may be called its privilege. The reason is the obvious one, that it is no longer capable of negotiation in the proper sense of the word; that is, it is no longer fit to be an instrument of business: in the first case, because it is already discredited, and cannot be considered the equivalent of money; and in the second, because there is no longer any time fixed when it can be paid or

converted into money. Hence it is now like paper not negotiable; that is, it may be sold or transferred as before, but the purchaser takes it now subject to the defence which could be made against it if it were still in the hands of the first party who transferred it after dishonor or after it fell due.—A bill of exchange should be presented for acceptance during the usual hours of business. The drawee may answer at once, or he may take a day for consideration; but if he does not accept before the end of the day after presentation, he refuses to accept. If not accepted absolutely, but upon some terms or conditions, the holder may assent to these, and then hold the acceptor; but he must treat it as no acceptance, and give notice accordingly in order to hold the drawer. When a bill is accepted it becomes like a note; and every bill and every note must be presented for payment, or in other words, payment of them must be demanded, and the demand must be such as the law requires, or all parties except the maker or acceptor are discharged. The paper must be so presented and demanded at maturity, by the holder or his authorized agent, of the acceptor or maker, on the very day on which it falls due, and in the usual and proper business hours of that day. Neither the bankruptcy, nor the insolvency, nor the absence, nor the death of the acceptor or maker is a sufficient excuse for not making the demand. For the insolvent may pay it, and if the payer is absent the demand must be made at his house or residence, or at his place of business; and if he is dead, it must be made of his executors or administrators. If the holder dies before the paper matures, and his executors or administrators are not appointed until after it matures, they must make the demand as soon after as they can; and if they make it without unreasonable delay, it is sufficient. Generally, when the demand cannot be made in the usual way at the time, the law permits it to be made within a reasonable time after the obstruction is removed. If the payer has absconded, or has no place of residence or business in the state, or is absent and cannot be found by diligent inquiry, demand is excused. But the same notice must be given of this non-demand as of non-payment; for the parties liable on the paper have not only a right to require demand upon all persons liable before them, but the further right to have notice given them if the paper is not paid. The purpose of this is to give them every opportunity of getting such security or indemnity as they can from the parties for whom they are to make payment. Once, the law said only that the notice must be given in a reasonable time; but now, all over the commercial world, the law itself defines this reasonable time. It requires that this notice be given on the day of non-acceptance or non-payment, or on the day immediately following. If the party en-

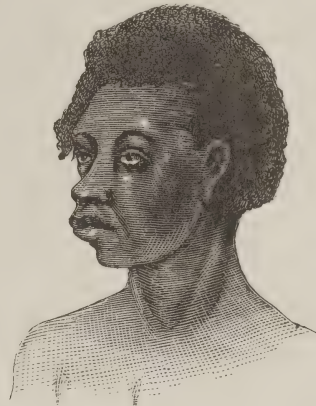
titled to notice lives at a distance, the notice should be given by mail, and must be put into the mail on the day of dishonor or the next day, if there be such a mail, and otherwise into the first mail that goes. A personal notice is, in general, good wherever given. And it should be personal, or in writing left at the residence or place of business, if the person giving the notice (as the notary or agent) lives in the same town or city with the party to whom it is given. He may send it even then by mail, but takes the risk of its reaching the party in season; but if it is sent out of town he may send it by mail, and this risk is not on the sender.—As the holder has one whole day to give his notice, so every one receiving notice has the same indulgence. Thus, if a note with six indorsers falls due, and the indorsee makes due demand of the maker, he must give notice of the non-payment to his indorser (who is the sixth) on the next day. That indorser has also until the next day to notify the fifth, and so on. Hence the first indorser will not get notice until the sixth day after non-payment; but now he will be held not only to his indorsee but to all persons below him, because he has had his due notice. No person, however, is entitled to the delay of more days than his own single day. Thus, if the indorsee of the sixth indorser notifies his indorser on the next day, he holds him; but if that indorser neglects to notify others, and the holder, learning this, on the third day notifies all the rest, all are discharged but the sixth indorser. Hence, it is usual for the holder not to take the risk of this, but to send notice himself to all the persons whose names are on the paper. (See NOTARY PUBLIC.) There is no precise form necessary for the notice. It should, however, state with sufficient distinctness what the paper is, its dishonor, and who the parties are, and the purport of the notice. After due demand and due notice have fixed the liability of parties, it remains in force, and there is no need of immediate suit. This right to demand and notice may be waived by any party entitled to it, and he may do this by any words of sufficient meaning; the usual way is by writing over his name when he indorses: "Waives demand and notice." It should be remembered that a waiver of notice is not a waiver of demand; although a waiver of demand is perhaps a waiver of notice.—The demand must be made when the note falls due, or, to use the common phrase, at its maturity. But this is not at the expiration of the time when the note is made payable on the face of it. The law adds three whole days, which are called days of grace. At first these were, as the name intimates, days of favor or mere indulgence; but usage, and now law, have converted them into an absolute right. In most of the states statutes provide that all negotiable paper, not payable at sight or on demand, is entitled to three days of grace, unless it be expressly agreed otherwise. This is sometimes

done, but not often; and the words used for this purpose are, simply, "without grace." One distinction is important. These days retain so much of their original character of mere indulgence, that if the last day of grace falls on Sunday, or on any holiday on which payment cannot be demanded, it is now due, and demand must be made, on the Saturday or other day preceding. But if paper without grace, or any payment not entitled to grace, falls due on Sunday, or any other legal holiday, the payer now gains a day, because payment cannot be demanded until Monday, or the day after the holiday. When and in what manner negotiable paper should be protested for non-payment, and how payment may be made *supra protest*, or for honor, will be stated in the article *PROTEST*.—It should be added, that of late years some other instruments besides bills of exchange and promissory notes have been treated by courts as negotiable paper. Exchange bills in England were so held; and then the bonds of foreign states, payable to the holder, were so considered. In the United States the same doctrine has been extended to state and municipal bonds payable to bearer and transferable by delivery; and also to similar bonds of private corporations and their coupons. In some states all demands are so far negotiable that assignees are permitted to sue thereon in their own names.

NEGRELLI, Aloys von, an Austrian engineer, born at Primiero, Tyrol, Jan. 23, 1799, died in Vienna, Oct. 1, 1858. From 1832 to 1840 he was employed in Switzerland, and constructed the first Swiss railway, from Zürich to the German frontier. Subsequently he was chief inspector of the Austrian northern railway till 1849, when he became general director of public works. He was at the head of all Austrian railways from 1855 to 1857, when about a year before his death the viceroy of Egypt placed him in charge of the works connected with the cutting of the isthmus of Suez.

NEGRITOS, natives of the Philippine islands, usually classed with Papuans. They in a measure represent the people called *negrillos* by Dr. Pickering in his "Races of Men" (1848), where he classes them as a subdivision of the Papuan race, and of the melanic or black family of mankind. They were formerly in possession of the entire group of islands, but are now found only in the mountainous districts of some of them, and especially in the northern portion of Luzon, where they inhabit also the coast from Palanan to Cabo Engano. (Semper, *Die Philippinen und ihre Bewohner*, Würzburg, 1869.) Fr. Müller in his *Allgemeine Ethnographie* (Vienna, 1873) classifies them among the Papuans of the pure type, while A. R. Wallace considers them a totally distinct race, and, connecting them with the inhabitants of the Andaman islands in the bay of Bengal, is of opinion that they are probably of Asiatic rather than Polynesian origin; and Peschel in his *Völkerkunde* (2d ed., Leipsic, 1875) prefers to

call them Asiatic Papuans, in distinction from Australian Papuans. In common with the latter, they have woolly hair and a flat nose, broad at the base. They are not black, but of



Negrito.

a dark copper color. The lips are somewhat puffed, and the jaws are slightly projecting. Virchow's measurements of some skulls have led to the supposition that their compressed form is of artificial origin. (See PAPUAN RACE AND LANGUAGES.)

NEGRO (Span. and Ital., from Lat. *niger*, black), a name properly applied to the races inhabiting the African continent, principally between lat. 10° N. and 20° S., and to their descendants in the old and new world. It does not include the northern Africans (like the Egyptians, Berbers, Abyssinians, Nubians, &c.), nor the Hottentots in the south, although in popular language, especially in the older writings, it comprises these and other dark-skinned



Negro.

nations, who are not characterized by the crisp hair of the true negro; in some of the border countries there has been considerable intermixture of negro blood and dialects. The

term negro, therefore, is not synonymous with African, and is not a national appellation, but denotes an ideal type distinguished by certain physical characters, such as are seen in the people of the coast of Guinea, viz.: black skin, woolly hair, flat nose, thick everted lips, and a prognathous form of the skull. Negroes occupy about one half of Africa, excluding the northern and southern extremities, but including its most fertile portions. Out of Africa, they are found in various parts of Asia and its islands, and throughout America and the West Indies, whither they were originally carried chiefly as slaves (see SLAVERY); they are rare in Europe. They were nearly unknown to the Hebrews and the Homeric Greeks; the Egyptians, however, about 2300 B. C., became acquainted with negroes through the conquests of their rulers, and represented them on their monuments as early as 1600; for nearly 35 centuries the type has remained unchanged in Egypt. The Greeks first knew them in the 7th century B. C., their Ethiopians being merely any people darker than the Hellenic, like the Arabs, Egyptians, Libyans, or Carthaginians, none of which are negroes. The typical negroes of the Guinea coasts are generally rude and nearly naked savages, of a deep black color and ugly features; in the interior, many of the tribes, like the Fan and others visited since 1855 by Paul Du Chaillu and Winwood Reade, are fierce cannibals, but fine-looking, warlike, ingenious, and skilful in the working of iron. Those on the Slave coast are the most degraded, selling their neighbors to slave dealers. In the vast regions explored by Livingstone, Barth, Du Chaillu, Burton, Speke, Baker, Schweinfurth, and other recent travellers, there are many tribes more or less savage, for an account of which the reader is referred to the respective special notices in this work, and chiefly to the narratives of these explorers. The Caffres of South Africa may also be classed among negroes, as well as the fine and ferocious races of Mozambique and the E. coast of Africa.—The skin of the negro is soft and silky, dull cherry red in the infant and growing black very soon; it differs from that of the whites principally in the greater amount of pigment cells in the *rete Malpighii* (the epidermis being uncolored), and in the greater number of cutaneous glands. The hair, though called wool, does not present the characters of the latter, especially the imbricated projecting scales, and differs but little from that of the other races except in color and in its curled and twisted form; it is harsh and wiry, and, according to some microscopists, more or less flattened, grooved longitudinally, lying perpendicularly in the dermis and piercing the cuticle in this direction, the coloring matter being diffused throughout its substance, and in a few instances so imbricated as to be capable of felting like wool. The skull is long and narrow, with a depressed forehead, prominent

occiput and jaws, a facial angle of 70° to 65°, and an internal capacity of about 82 cubic inches; a peculiarity of some negro crania, though by no means constant, is that the sphenoid does not reach the parietal bones, the coronal suture joining the margin of the temporals; the skull is very thick and solid, as would be indicated by the negro's favorite mode of fighting, both sexes butting like rams, and so flat that burdens are easily carried upon it. The stature of the negro is seldom 6 ft., and rarely below 5½; some of their figures are fine, especially the *torso*, and have been taken by Chantrey and other sculptors as models; in the female the development is so rapid that it is common to see childhood's natural grace combined with the prominent characteristics of maturity. Seen from behind, the spine usually appears depressed, owing to the greater curvature of the ribs; the nates are more flattened than in other races, and join the thighs almost at a right angle instead of a curve. Besides the characters already mentioned, may be noticed the projecting upper edge of the orbit; broad retreating chin; great development of lower part of face; small eyes, in which but little of the yellowish white ball is seen; small, thick ears, standing off from the head, with a small lobe and a general stunted look; black iris; very wide zygomatic arches, giving large space for the muscles of the lower jaw; large and transverse opening of the nasal cavity. The pelvis is long and narrow, its average circumference being from 26 to 28 in. instead of 30 to 36 as in the whites; this shape in the female, according to Vrolik and Weber, corresponds to the characteristic shape of the negro head; those writers consider it a type of degradation, as it approaches that of the *quadrumanus* in the more vertical direction of the iliac bones and their less width, in the smaller breadth of sacrum, and in the consequent less extent of the hips. The bones of the leg are bent forward and outward, the tibia and fibula being more convex than in Europeans; the calves are very high; the feet and hands are flatter; the heel bone, instead of being arched, is continued in a straight line with the other bones of the foot, causing it to project more behind; in consequence of the longer lever thus obtained, less muscular force is necessary in the movements of the feet, and the muscles of the calf are consequently less developed; the shoulder blades are shorter and broader; the muscles have shorter bellies and longer tendons, as is very evident in the legs and arms. Negroes have less nervous sensibility than the whites, and are not subject to nervous affections; they are comparatively insensible to pain, bearing severe surgical operations well; the effects of opium and other narcotics appear rather in the digestive, circulatory, and respiratory functions, than in the cerebral and nervous system; they are little subject to yellow fever, and more to yaws and other cutaneous affections; they are generally

very torpid under disease. They seldom have a fetid breath, but transpire much excrementitious matter by means of the glands of the skin; there is also much oily matter in the skin. The negro flourishes under the fiercest heats and unhealthy dampness of the tropics, withstanding the virulent endemics and epidemics of the country where the white man soon dies; and the race does not diminish, like the aboriginal American, in contact with civilization. The senses are acute; the voice in the males is hoarse and not powerful, and in the females high and shrill. Albinoes are not uncommon among negro races in all countries. Negroes produce with the white and other races a hybrid race, fertile for a few generations; but, unless mixed with the original stock, tending to extermination by disease and sterility. The offspring of a negro and white is called a mulatto; of a mulatto and white, a quadroon; a greater intermixture of white blood than this can with difficulty be distinguished by the ordinary observer from a dark-skinned white.—The African negroes display considerable ingenuity in the manufacture of weapons, in the working of iron, in the weaving of mats, cloth, and baskets from dyed grasses, in the dressing of skins of animals, in the structure of their huts and household utensils, and in the various implements and objects of use in a barbarous state of society. Their religion consists in the worship of idols and fetiches, representing a supreme power which they all acknowledge; they believe in good and evil spirits, in witchcraft, charms and spells, omens, lucky and unlucky days, &c.; they make fetiches of serpents, elephants' teeth, and many similar objects, and reverence wooden images and sacred things, which they think have received a peculiar power from their divinities to drive away evil spirits, and protect them from danger, disease, and witchcraft. They make prayers and offerings to their idols, and have sacred songs, festivals, dances, ceremonies, and places; they sacrifice animals and sometimes human victims, especially during obsequies; they have priests and holy men, who are also magicians and doctors. They believe generally in an after life, without any distinct idea of retribution, and some tribes in the transmigration of the human soul into a gorilla, or other beast, bird, reptile, or fish; they have great fear of ghosts and apparitions; they become ready converts to foreign religions, whether Islamism, Catholicism, or Protestantism. Being very fond of music, they have many ingeniously contrived musical instruments, generally of a noisy character; they have a keen sense of the ridiculous, and are of a cheerful disposition; though cruel to their enemies and prisoners, and setting little value on human life, they are naturally kind-hearted, hospitable to strangers, and communicative of their joys and sorrows; the females are remarkably affectionate as mothers and children, and as attendants on the sick, even to foreign-

ers. They are less dirty in their persons and dwellings than most other barbarous races. They are ready to receive instruction, and to profit by it up to a certain point; quick to perceive the beauty of goodness, they generally appreciate the services of the missionaries in their behalf, and were not their teachings counteracted by the intoxicating drinks brought by traders, they would probably in time, in outward observances if not in reality, merit the name of semi-Christian communities.—For negro languages, see AFRICA, LANGUAGES OF, and articles on the more important tribes.

NEGRO, Rio. See RIO NEGRO.

NEGROPONT. See EUBÆA.

NEHEMIAH, a Jewish governor of Judea under the Persians, and cup-bearer to King Artaxerxes Longimanus. He was the son of Hakaliah, received the surname or title of Tirshatha, and is the author of at least a portion of the Scriptural book which bears his name, a continuation of the historical book of Ezra. It gives the most important events in the life of Nehemiah, very full accounts of the rebuilding of the gates and walls of Jerusalem, statistical information on the increase of the people, and lists of priests and Levites. The authorship of chapters i. to vii. is generally ascribed to Nehemiah, while the following chapters are assumed by De Wette, Hävernick, and others, to have been written by some other author. According to Ewald, Bertheau, and others, the books of Nehemiah, Ezra, and the Chronicles were originally one work. All the questions relating to the book of Nehemiah are fully discussed in De Wette's *Einleitung in das Alte Testament* (8th ed., revised by Dr. Schrader). The dates of his birth and death are unknown. In the history of his people, in which he played a prominent part during the period of the restoration under the Persians, he first appears in 445 B. C. (See HEBREWS, vol. viii., p. 590.)

NEHER, Bernhard von, a German painter, born at Biberach, Würtemberg, in 1806. He studied under his father, Joseph Neher, and in Stuttgart, Munich, and Rome, where the king of Würtemberg enabled him to spend four years. After his return to Munich he executed, from cartoons which he had prepared in Italy, a stupendous fresco on the Isar gate of Munich, representing the entrance of the emperor Louis of Bavaria, which gave him a wide reputation, but was unfortunately partly destroyed. In 1836 he went to Weimar to embellish the grand-ducal palace with frescoes illustrative of Schiller and Goethe. In 1844 he became director of the art school at Leipsic, and in 1846 of that of Stuttgart. He was made a director of the latter in 1854, and decorations were conferred upon him in 1865 and 1869.

NEHLIG, Victor, an American painter, born in Paris in 1830. He studied under Abel de Pujol and Cogniet, removed in 1856 to the United States, spent some time in Cuba, became a resident of New York, and in 1870 was chosen

a member of the national academy of design. In 1872 he visited England. Among his pictures are "The Artist's Dream," "The Captive Huguenot," "Gertrude of Wyoming," "Hiawatha and Minnehaha," and "Pocahontas."

NEILGHERRY HILLS (Sansk. *Nilgiri*, blue mountains), a group of mountains in southern India, comparatively isolated from the other mountain systems of the country, but connected by an elevated ridge with the adjacent table land of Mysore, and thus with the Western Ghats, and by hill ranges also with the Eastern. They are situated between lat. $11^{\circ} 10'$ and $11^{\circ} 38' N.$, and lon. $76^{\circ} 30'$ and $77^{\circ} 10' E.$, in the W. part of the province of Madras, of which they form a political district (pop. in 1872, 50,194). The region to which they belong was transferred to the British in 1799 on the downfall of Tippoo Sahib. At an elevation of 5,000 ft. the group has a maximum length of 42 m. measured from N. E. to S. W., and averages 14 m. in width. Its general outline is triangular, with one side fronting Mysore and the other Malabar. On the south, at Palghat, the Neilgherries overlook the pass known as the gap of Coimbatore, which separates them from the hill region at the S. extremity of the peninsula. The surface of the mountains varies greatly in aspect and elevation, from undulating slopes and low ridges to grand peaks of lofty height. The highest is Dodabetta, 8,760 ft. above the sea, which was long supposed to be the loftiest summit in India S. of the Himalaya, but is now known to be surpassed by a mountain in the Annamalli range further S., which is a few hundred feet higher. Of the other peaks in the Neilgherry hills, five are more than 8,000 ft. high, four exceed 7,000 ft., and there are six over 6,000 ft. Granite is the prevailing geological formation, and the soil generally is black, rich, and fertile. Peat occurs in some localities. The unhealthy forest belt at the base of the group was long an obstacle to exploration; it is the haunt of numerous wild beasts, including the elephant and the tiger. In the hills the wood districts are open and park-like, while at the higher elevations is a well watered grass country with the vegetation of the temperate zone. The native Todas of this region differ both in appearance and language from all other races in India. They are tall and well formed, with light complexions and strongly marked Jewish features. Infanticide and polygamy prevail among them. A Hindoo tribe known as the Badakars, however, constitutes a prosperous, influential, and numerous portion of the population. Several other tribes are met with, sunk in the depths of degradation and superstition. The most important pursuit in the Neilgherry district is the cultivation of cinchona, introduced by the British government in 1860, and now also carried on by private planters. In 1871-'2 the government plantations covered 950 acres, and contained more than 2,500,000 plants, which yielded 72,983 lbs. of bark. There is also a government teak plan-

tation; and magnificent plantations of eucalyptus have been formed under the direction of the Madras forest department. The principal European station is at Utakamund, a small town 7,300 ft. above the sea, in lat. $11^{\circ} 24' N.$, lon. $76^{\circ} 47' E.$, near the centre of the group.

NEILSON, Lillian Adelaide. See supplement.

NEISSE, a fortified town of Prussian Silesia, on the southern Neisse at its confluence with the Biela, 30 m. S. W. of Oppeln; pop. in 1871, 19,376. The fortress, one of the most important in Prussia, was built by Frederick the Great. The town is clean and well built, and contains two Lutheran and eight Roman Catholic churches, a Roman Catholic gymnasium and other schools, several manufactories of linens and woollens, arms, and gunpowder, and a number of distilleries. Neisse was besieged three times in 1428 by the Hussites, taken by Frederick the Great in 1741, unsuccessfully besieged by the Austrians in 1758, and reduced by the French in 1807. In February, 1873, it was proposed to dismantle the fortifications.

NELATON, Auguste, a French surgeon, born in Paris, June 17, 1807, died there, Sept. 21, 1873. He studied under Dupuytren, took his degree in 1836, and was surgeon of prominent hospitals, adjunct professor in the faculty of Paris from 1839 to 1851, and subsequently regular professor of clinical surgery till 1867. In 1868 he was made senator. He was also a member of the academy, and the favorite surgeon of Napoleon III. He invented a remarkable method for the immediate extraction of calculi, distinct from all the processes of lithotritry, and effected many successful operations in this and other branches of his profession. With Velpeau and others he published *Rapport sur les progrès de la chirurgie* (1867); but his principal work is *Éléments de pathologie chirurgicale* (5 vols., 1844-'60; 2d ed., 1867-'70), of which vol. v., and according to some authorities also vol. iv., were written by Dr. A. Jamain.

NELSON. I. A central county of Virginia, bordered S. E. by the James river and N. W. by the Blue Ridge, and drained by the Rockfish, Rock, and Tye rivers; area, 340 sq. m.; pop. in 1870, 13,898, of whom 6,312 were colored. The surface is hilly and the soil fertile. A canal extending along the James river connects it with Richmond, and it is intersected by the Washington City, Virginia Midland, and Great Southern railroad. The chief productions in 1870 were 77,106 bushels of wheat, 186,858 of Indian corn, 98,771 of oats, 12,707 of Irish and 4,374 of sweet potatoes, 1,199,182 lbs. of tobacco, 6,629 of wool, 111,524 of butter, and 5,122 gallons of sorghum molasses. There were 1,952 horses, 2,246 milch cows, 707 working oxen, 3,073 other cattle, 3,048 sheep, and 8,423 swine. Capital, Lovingsston.

II. A central county of Kentucky, drained by Rolling fork and Beech fork of Salt river; area, about 350 sq. m.; pop. in 1870, 14,804, of whom 3,918 were colored. It has an undulating surface and a fertile soil, especially to-

ward the north. It is traversed by the Louisville and Nashville and Great Southern railroad, and its Lexington division. The chief productions in 1870 were 148,294 bushels of wheat, 22,085 of rye, 774,315 of Indian corn, 151,589 of oats, 25,583 of sweet potatoes, 5,150 tons of hay, 28,282 lbs. of wool, 205,289 of butter, and 8,713 gallons of sorghum and 10,052 of maple molasses. There were 5,406 horses, 1,542 mules and asses, 3,364 milch cows, 7,916 other cattle, 11,096 sheep, and 35,534 swine; 4 manufactories of carriages and wagons, 8 distilleries, 3 flour mills, 14 saw mills, and 2 wool-carding and cloth-dressing establishments. Capital, Bardstown.

NELSON. **I.** A province of New Zealand, forming the N. W. part of South island, bounded E. by the province of Marlborough, and S. by Canterbury; area, 11,000 sq. m.; pop. in 1871, 22,501. A portion of the W. part is mountainous. Iron, copper, and gold are found. The exports of gold from April 1, 1857, to Dec. 31, 1871, amounted to 1,126,504 oz., valued at £4,458,000. **II.** A seaport town, capital of the province, on a small harbor at the bottom of Blind bay, 78 m. (150 m. by water) W. of Wellington, and 1,280 m. S. E. of Sydney, Australia; pop. about 6,000; with suburbs, 8,000. It is the seat of an Anglican bishop, and has a literary institute and museum, numerous public and private schools, a college, several churches, and three branch banks. The chief manufactures are cloth and leather. Steamers ply regularly to the neighboring ports and Melbourne, and periodically to Sydney. Four newspapers were published in 1873, one of which was a daily.

NELSON, David, an American clergyman, born near Jonesborough, Tenn., Sept. 24, 1793, died at Oakland, Ill., Oct. 17, 1844. He was educated at Washington college, Va., and studied medicine in Danville, Ky., and at Philadelphia. He joined a Kentucky regiment as a surgeon in the war of 1812, and proceeded to Canada. On his return he resumed the practice of medicine. After making a profession of religion in early life, he relapsed into infidelity, but at length returned to his religious convictions, became a minister in the Presbyterian church, and was licensed to preach in 1825. He preached for nearly three years in Tennessee, and was engaged in the publication of a periodical called "The Calvinistic Magazine." In 1828 he succeeded his brother Samuel as pastor of the Presbyterian church in Danville, Ky. In 1830 he removed to Missouri, establishing a college in Marion co., 12 m. from Palmyra, of which he became the first president. In 1836, owing to the slavery question, Dr. Nelson, who was a warm emancipationist, removed to the neighborhood of Quincy, Ill., and established an institute for the education of young men. In the latter part of his life he was subject to epilepsy, which gradually impaired his faculties. He published "The Cause and Cure of Infidelity," which passed through many editions.

NELSON, Horatio, Viscount Nelson of the Nile, a British admiral, born at Burnham Thorpe, Norfolk, Sept. 29, 1758, killed in the battle of Trafalgar, Oct. 21, 1805. His childhood was marked by the fearless spirit for which he afterward became distinguished. He left school at the age of 12, and became a midshipman on board a ship destined for an attack on the Falkland islands; but this expedition having been given up, he went in a merchant ship to the West Indies. In 1773, although a boy, he sailed as coxswain of one of the two ships of Capt. Phipps's arctic expedition. On returning he was placed on board the man-of-war Seahorse, which sailed for the East Indies; but the climate soon prostrated him, and within 18 months he was compelled to return to England. Recovering his health on the voyage home, he passed with credit an examination for a lieutenantcy, April 8, 1777, and was appointed second lieutenant on the Lowestoffe, which was employed against the French and American privateers, who were harassing the British trade in the West Indies. He soon afterward became first lieutenant on board the Bristol flag ship; in December, 1778, was appointed commander of the Badger brig, and post captain on June 11, 1779, when he was assigned to the Hinchinbrook, 28, in which he distinguished himself at the siege of Fort San Juan and took the island of St. Bartholomew. But the crew of the Hinchinbrook were decimated by fever, and its commander was forced to return to England. He was next appointed to the Albemarle, 28, in the winter of 1781-2 cruised in the North sea, sailed for Quebec in April, 1782, and thence with a convoy to New York; he there joined the fleet under Sir William Hood, and with him went to the West Indies, where he remained till the peace of 1783. After his arrival in England he retired to St. Omer, but in the spring of 1784 took command of the Boreas, 28, ordered to the West Indies. At Nevis he captured four American vessels for violating the navigation laws. At the same island, March 11, 1787, he married a widow, the daughter of the governor, Mr. Herbert. After his return to England a writ was served upon him on the part of the American captains, who laid their damages at £20,000. But the government protected him, and he had no more trouble with the suit. When the war with France broke out he was appointed, Jan. 30, 1793, to the Agamemnon, 64, and joined the Mediterranean fleet commanded by Lord Hood. By him he was sent with despatches to Naples, where he made the acquaintance of Sir William and Lady Hamilton. Subsequently he commanded a small squadron sent to Corsica to coöperate with Paoli against the French, and took Bastia, May 19, 1794, after a siege of seven weeks. The Agamemnon was then ordered to Calvi to assist Gen. Sir Charles Stuart in the siege of that place. Here Nelson lost an eye from sand and small gravel driven into it by a shot striking the

ground near where he stood. His name was not mentioned in the "Gazette," however, and he keenly felt the neglect. Afterward serving under Admiral Hotham, who had succeeded Lord Hood, he distinguished himself in the engagement with the French fleet, which had come out from Toulon to give battle to the English, and boarded the *Ca Ira* and the *Censeur*, the only two ships taken. About this time he was made colonel of marines, and, hoisting a commodore's pennant, proceeded to the coast of Italy, blockaded Leghorn, and superintended the evacuation of Corsica. In sailing with a convoy to Gibraltar, he saw the Spanish fleet at the mouth of the straits, and on Feb. 13, 1797, brought the intelligence to Admiral Sir John Jervis, then commanding the Mediterranean squadron. By him he was appointed to the *Theseus*, 74, and participated in the battle of Cape St. Vincent on the morning of the 14th. In this battle Nelson disobeyed the admiral's orders to tack in succession, and, seconded by Trowbridge in the *Culloden* and *Collingwood* in the *Excellent*, bore down upon seven of the enemy's fleet, attacked the *Santissima Trinidad*, 136, passed on to the *San Nicolas*, 84, which he carried by boarding, and led his men on to the *San Josef*, 112, lying alongside, and compelled it to surrender. For his conduct Nelson, who had been created rear admiral before the action was known in England, was knighted and made a companion of the order of the bath. In April he was sent to bring away the troops from Porto Ferrajo, and shortly after commanded the inner squadron in the blockade of Cadiz. On July 14 he was sent to attack Santa Cruz, Teneriffe, and carried the place, but, not being able to capture the citadel, was forced to retire. In the attack his right arm was shattered by a grape shot, making amputation necessary, and he returned to England, where honors were showered upon him. Congratulatory letters were addressed to him by the first lord of the admiralty and the duke of Clarence; the freedom of the cities of London and Bristol was conferred upon him; he was made a knight of the bath, and received a pension of £1,000. In April, 1798, hoisting his flag in the *Vanguard*, 74, he rejoined Earl St. Vincent at Gibraltar, and on May 9 sailed from that place with a small squadron to ascertain the design of the vast armament fitting out at Toulon. On the 22d he encountered in the gulf of Lyons a sudden storm by which his ship was dismantled, and in the fog that followed he missed the French fleet, which had sailed for Egypt with Bonaparte and his army on board. Having received a reinforcement of ten ships of the line and one of 50 guns, he sailed for Alexandria, but failed to find the enemy. After obtaining supplies at Syracuse, he sailed again for Egypt, and on the morning of Aug. 1 descried the tri-color floating from the walls of Alexandria and the bay of Aboukir covered with ships. The

fleets joined battle at 6½ P. M., and, with an interruption of ten minutes, when the French flag ship *L'Orient* blew up, maintained it till daybreak. (See *ABOUKIR*.) Nelson declared victory a too feeble word for the result of this battle, and called it a conquest. Had he been provided with small craft, he could have destroyed in a few hours the store ships and transports in the harbor of Alexandria; and so deeply did he feel the want of these, that in a despatch to the admiralty he declared: "Were I to die this moment, want of frigates would be engraven on my heart." During the engagement Nelson received a severe though not dangerous wound on the head from a langridge shot. The news of the battle of the Nile was received with boundless enthusiasm by the enemies of France, and congratulations and rewards without number were showered upon the victorious commander. He was created Baron Nelson of the Nile, with a pension of £2,000 to himself and his two immediate successors; received magnificent presents from the sultan, the king of Sardinia, the king of Naples, the emperor of Russia, and the East India company; and the thanks of parliament and gold medals were voted to him and the captains engaged in the action. Seventeen days after the battle Nelson sailed for Naples, and was received with great demonstrations of joy both by the populace and the court. Encouraged by his victory, the Neapolitan government broke openly with the directory, and sent an army under Gen. Mack against the French troops occupying the Papal States. But an incapable commander and cowardly soldiers were no match for the forces of France. The invading army was beaten back, Naples was entered in turn, the royal family compelled to flee, and the short-lived Parthenopean republic established. The king and queen and their suite were conveyed by Nelson to Palermo. The royalists, however, soon took the field under the lead of Cardinal Ruffo, and advanced upon the city of Naples. The garrisons of the *castel Nuovo* and the *castel dell'Ovo*, consisting of Neapolitan insurgents, capitulated to the cardinal, June 23, 1799, on condition that they should be allowed to march out with all the honors of war, and that the persons in the forts and all prisoners taken by the king's troops should be unmolested or conveyed to Toulon and there set at liberty. The part taken by Nelson in annulling this capitulation has been condemned as an ineffaceable blot upon his fame by Southey and nearly all his other biographers; but the publication by Sir Harris Nicolas of the "Nelson Despatches" places his conduct in a much more favorable light. On the 24th Nelson arrived in the bay, and immediately ordered the flag of truce to be pulled down, on the ground that the action of the cardinal in granting a capitulation was not only unauthorized but in direct opposition to the commands of the king, whose orders were explicit not to treat with the rebels. On

the next day, no steps having yet been taken to carry the capitulation into effect, he addressed a note to the garrisons, stating that he would not permit them to embark or leave those places, and their surrender must be at discretion. On the 26th the insurgents submitted, with full knowledge that the cardinal's conditions had been annulled, and were detained as prisoners until the arrival of the king, July 10, when they were given up to the Neapolitan authorities. That Nelson was justifiable in this transaction is now generally admitted; that he did not act without regard to honor and good faith is apparent from his treatment of the garrison of Castellamare, who having surrendered before his arrival were permitted to go free, although the officer who received their capitulation had no authority to grant them terms. The hanging of Prince Caraccioli, the Neapolitan admiral, who had joined the insurgents and served under the "Parthenopean republic," is another event which clouds Nelson's memory. Caraccioli was accused of being a traitor, and having been captured and given up to Nelson was tried by a Neapolitan court martial, who condemned him to death, and submitted their sentence to Nelson as superior officer for confirmation. It has been charged, though perhaps without sufficient proof, that in these transactions the British admiral acted under the baneful influence of Lady Hamilton, with whom his illicit connection had already commenced. Although ordered by Lord Keith to sail with his whole force for the protection of Minorca, he continued in the bay of Naples, and succeeded in restoring the king to his dominions. For his services he received a sword splendidly enriched with diamonds, and was rewarded with the dukedom of Bronte, with a revenue of £3,000 a year. He soon after assisted Capt. Ball in the siege of Malta; but, mortified by the appointment of Lord Keith to the chief command in the Mediterranean, he returned to England through Germany in company with Sir William and Lady Hamilton, and landed at Yarmouth, Nov. 6, 1800, after an absence of three years. Honors of every kind awaited him; but within three months he was separated from his wife on account of his infatuated attachment to Lady Hamilton. His last words to his wife were: "I call God to witness that there is nothing in you or in your conduct that I wish otherwise." In December, 1800, a maritime alliance was formed between Russia, Prussia, Denmark, and Sweden in regard to the rights of neutral nations in war. For the purpose of breaking up this confederacy, a fleet of 52 sail was sent in March, 1801, to the Baltic under Sir Hyde Parker, Nelson consenting to act as second in command. The squadron passed the Sound on the 30th, and entered the harbor of Copenhagen. To Nelson, at the head of 12 ships of the line and smaller vessels, making 36 in all, was assigned the attack; against him were opposed 18 vessels

mounting 628 guns, moored in a line a mile in length, and flanked by two batteries. The action began about 10 A. M., April 2, and lasted five hours. About 1 o'clock Sir Hyde Parker made the signal for discontinuing. Nelson ordered it to be acknowledged, but, putting the glass to his blind eye, exclaimed: "I really don't see the signal. Keep mine for closer battle still flying. That's the way I answer such signals. Nail mine to the mast." By 2 o'clock, the Danish fleet being almost entirely taken or destroyed, he wrote to the crown prince the following note: "Vice Admiral Lord Nelson has been commanded to spare Denmark when she no longer resists. The line of defence which covered her shores has struck to the British flag; but if the firing is continued on the part of Denmark, he must set on fire all the prizes he has taken, without having the power of saving the men who have so nobly defended them. The brave Danes are the brothers and should never be the enemies of the English." An armistice of 14 weeks was agreed to, and in the mean time the policy of Alexander, the new emperor of Russia, broke up the confederacy, and left matters on their old footing. For this battle, which Nelson said was the most terrible of all in which he had ever been engaged, he was raised to the rank of viscount. On July 24 he was made commander-in-chief, from Orfordness to Beachy Head, of the squadron for the defence of England; and on Aug. 15 he attacked the flotilla at Boulogne, but was forced to retreat with considerable loss. After the treaty of Amiens he retired with Sir William and Lady Hamilton to his seat at Merton in Surrey. But war breaking out again, he was appointed commander of the Mediterranean fleet, and set sail May 20, 1803. He immediately blockaded Toulon, but in spite of his utmost vigilance a fleet escaped out of that port on Jan. 18, 1805, and shortly afterward joined the Cadiz squadron. Nelson followed in pursuit to the West Indies, and back again to Europe, but being unsuccessful he returned to England. Upon the receipt of the intelligence that the combined French and Spanish fleets were in Cadiz, he resumed his command of the Mediterranean fleet, and encountered the enemy off Cape Trafalgar, Oct. 21, 1805. The force under him consisted of 27 ships of the line and 4 frigates; the force opposed of 33 ships of the line and 7 frigates. On that day he wore his admiral's coat, bearing upon his left breast the insignia of the orders with which he had been invested. To all remonstrance against wearing so conspicuous a uniform he replied, referring to the insignia: "In honor I gained them, and in honor I will die with them." At 11.40 A. M., while bearing down on the enemy, he hoisted the signal, "England expects every man to do his duty," which was received with tremendous cheering by the whole fleet. At 10 minutes after noon the action began. In the heat of the battle, about 1½ P. M., he was struck in the shoul-

der by a musket ball. "They have done for me at last, Hardy," said he, as he was raised up from the deck; "my backbone is shot through." He was carried below, and the surgeon examining his wound pronounced it to be mortal. He continually expressed the greatest anxiety as to the result of the battle. At length Capt. Hardy came down from the deck, and congratulated his dying commander on having gained a complete victory. He did not know how many had struck, but 14 or 15 at least had surrendered. "That's well," answered Nelson, "but I had bargained for 20." Anxious that the vessels taken should be saved from the possible danger of a storm, he added in a stronger voice: "Anchor, Hardy, anchor. Do you make the signal." The order was not obeyed, and in the gale that came up the following night all but four of the prizes were destroyed or lost. Next to his country, Lady Hamilton occupied his thoughts. "Take care of my dear Lady Hamilton, Hardy; take care of poor Lady Hamilton." A few minutes before he died, he turned to the chaplain, and said: "Doctor, I have not been a great sinner. Remember that I leave Lady Hamilton and my daughter Horatia as a legacy to my country." He then frequently repeated: "Thank God, I have done my duty." These were the last words he uttered, and at 4½ P. M. he expired without a groan. The body was placed in a coffin made out of the mast of the *L'Orient*. This singular gift had been presented him by Capt. Hallowell, and before Nelson left London for the last time he had called at his upholsterer's and told him to get it ready, for he should soon require it. He was buried in St. Paul's cathedral, Jan. 8, 1806, and his funeral, conducted at the public expense, was the most solemn and magnificent spectacle which had ever been witnessed in England. Honors were heaped upon his family. His brother, the Rev. William Nelson, D. D., was created Earl Nelson of Trafalgar and Merton, with an annual grant of £6,000, and permission to inherit the dukedom of Bronte; £10,000 were voted to each of his two sisters, besides £100,000 for the purchase of an estate. A few hours before his death he appended a codicil to his will, in which he left Lady Hamilton as a legacy to his king and country, and his "adopted daughter, Horatia Nelson Thompson," to the beneficence of his country. "These," continues the document, "are the only favors I ask of my king and country at this moment, when I am going to fight their battle." This codicil his brother concealed until the parliamentary grant to himself had been completed; and to it and his dying request in behalf of the same persons the British people paid no attention.—Nelson is the greatest name in the naval annals of England. "He annihilated the French navy," says Alison, "by fearlessly following up the new system of tactics, plunging headlong into the enemy's fleet, and doubling upon a part of their line, in the same manner as Napoleon practised

in battles on land." As he left no legitimate children, his viscounty became extinct, but the barony devolved by limitation upon his brother William, whose grandnephew Horatio, Earl and Baron Nelson and Viscount Merton, is the present representative of the family. Horatia Nelson was the admiral's natural daughter, probably by Lady Hamilton; for it is a singular fact that while he is universally considered her father, her maternity is doubted, and there are not wanting patriotic British critics who maintain that the attachment between Nelson and Lady Hamilton was purely Platonic. Horatia was married to the Rev. Philip Ward, an English clergyman.—Among the biographies of Lord Nelson we may cite Clarke and MacArthur's "Life of Admiral Lord Nelson" (2 vols. 4to, 1809); Robert Southey's "Life of Nelson" (2d ed., 8vo, 1831); Pettigrew's "Memoirs of the Life of Vice Admiral Lord Viscount Nelson" (2 vols. 8vo, 1849); and E. De Forges, *Histoire de Nelson*, from official documents and Nelson's private correspondence (Paris, 1860). His letters to Lady Hamilton (2 vols. 8vo) were published in 1814, and the "Letters and Despatches of Lord Nelson," edited by Sir Harris Nicolas (7 vols. 8vo), in 1844-6.

NELSON, Samuel, an American jurist, born at Hebron, N. Y., Nov. 10, 1792, died at Coopers-town, Dec. 13, 1873. His father, a farmer, emigrated to the United States from the north of Ireland in the latter part of the 18th century. He graduated at Middlebury college, Vt., in 1813, studied law at Salem, N. Y., was admitted to the bar in 1817, and commenced practice at Cortland. In 1820 he was a presidential elector. From 1823 to 1831 he was circuit judge, after which he became associate justice, and in 1837 chief justice of the supreme court of the state of New York. In 1844 he was appointed associate justice of the United States supreme court. In 1846 he was a member of the state constitutional convention, and in 1871 of the joint high commission to settle the Alabama claims. In October, 1872, he was compelled by declining health to retire from the bench. He resided for more than 50 years at Cooperstown.

NELSON, Thomas, an American statesman, born in York co., Va., Dec. 26, 1738, died there, Jan. 4, 1789. His father, William Nelson, for many years president of the colonial council, sent him in his 14th year to Cambridge, England, where he was educated at Trinity college. In his 24th year he married, and settled at Yorktown, where he possessed a great estate and led a life of leisure. He became a decided partisan of the American cause, and rendered efficient service in the house of burgesses. He was a member of the provincial conventions of 1774 and 1775, and in that which met in May, 1776, to frame a constitution for Virginia, in which he offered the resolution instructing the Virginia delegates in congress to propose a declaration of independence. Having been elected a delegate to congress, he

signed the declaration of July 4, 1776. In May, 1777, he was obliged by indisposition to resign his seat. In the following August, during the alarm occasioned by the entry of the British fleet under Admiral Howe within the capes of Virginia, he was appointed commander-in-chief of the state forces; and soon after, in response to an appeal from congress, he raised a troop of cavalry which he led to Philadelphia. The danger apprehended from Howe's expedition having been averted, his corps was disbanded, and he resumed his duties as a member of the legislature. He strongly opposed the proposition to sequester British property, on the ground that it would be an unjust retaliation of public wrongs on private individuals. In February, 1779, he again took his seat in congress, but was soon obliged by illness to resign. In May, however, he was suddenly called upon to organize the militia to repel a marauding expedition which was ravaging the Virginia coast. Congress having called for contributions to provide for the French fleet and armament, the general assembly of Virginia resolved early in June, 1780, to borrow \$2,000,000 to be deposited in the continental treasury by the middle of the month. The public credit, however, was so low that there seemed little probability that the required sum could be obtained. Gen. Nelson on his personal security raised a considerable portion of the loan. About the same time he advanced money to pay two Virginia regiments ordered to the south, which had refused to march until their arrears were discharged. His ample fortune was so seriously impaired, that he was involved in pecuniary embarrassments in the latter part of his life. In 1781 he succeeded Jefferson as governor of the state, and to repel the invasion of the enemy was compelled to assume dictatorial powers; and it was in no small degree owing to his exertions that the American army was kept together during its stay in Virginia. His extra-legal acts were subsequently approved by the Virginia legislature. He participated in the siege of Yorktown as commander of the Virginia militia, and directed that his own house, the largest and best in the place, should be bombarded. He resigned his office in November, 1781, and passed the rest of his life in retirement.

NELSON RIVER, of British North America, issues from the N. extremity of Lake Winnipeg, passes through a series of lakes, and falls into Hudson bay, N. of Fort York, after a N. E. course of about 350 m. It discharges a great volume of water, but its navigation is almost impossible, owing to numerous rapids and falls.

NELUMBUM. See **WATER LILY**.

NEMAH. I. A S. E. county of Nebraska, separated from Missouri by the Missouri river, and intersected by the Little Nemaha; area, about 400 sq. m.; pop. in 1870, 7,593. The surface is diversified by undulating prairies, bluffs, bottom lands, and groves of oak, hickory, walnut, &c., along the streams. The

underlying rocks are limestone and sandstone, and the soil is fertile. The chief productions in 1870 were 33,790 bushels of wheat, 224,695 of Indian corn, 35,831 of oats, 16,140 of potatoes, 49,425 lbs. of butter, and 3,015 tons of hay. There were 728 horses, 539 milch cows, 1,587 other cattle, 454 sheep, and 1,483 swine. Capital, Brownville. II. A N. E. county of Kansas, bordering on Nebraska, and watered by numerous streams; area, 720 sq. m.; pop. in 1870, 7,339. It is traversed by the St. Joseph and Denver City railroad, and by the Central branch of the Union Pacific line. The surface is undulating, the soil fertile. The productions in 1870 were 112,612 bushels of wheat, 26,840 of rye, 358,871 of Indian corn, 107,737 of oats, 50,074 of potatoes, 12,018 lbs. of wool, 28,285 of cheese, 200,460 of butter, and 17,167 tons of hay. There were 3,307 horses, 3,405 milch cows, 5,815 other cattle, 3,591 sheep, and 4,119 swine. Capital, Seneca.

NEMEAN GAMES, one of the four great national festivals of the Greeks, so called from Nemea in Argolis, where they were held every second year. The first one the date of which can be fixed approximately on historical authority occurred in the 52d or 53d Olympiad (572-565 B. C.). The period from one celebration to another was called a Nemead. They were instituted by the seven against Thebes in commemoration of the death of the infant Opheltes, which had been destroyed by a dragon while Hypsipyle its attendant had gone to show the seven a well. On their return they slew the dragon and instituted funeral games. Other legends ascribe them to Hercules in honor of his destruction of the Nemean lion. It is probable, however, that these refer to a restoration of the ancient festival, and its alteration to a celebration in honor of Jupiter. At first they were of a warlike character, only warriors and their sons participating, but they were afterward thrown open to all the Greeks. The exercises consisted of horse racing, running in armor in the stadium, wrestling, chariot racing, quoit throwing, boxing, throwing the spear, archery, and musical contests. The prize was at first a chaplet of olive branches, but afterward one of parsley. The management of these games belonged at different times to Cleonæ, Corinth, and Argos. Philip of Macedon was once honored by the Argives with the presidency of the Nemean games; and at their celebration in 195 B. C., Quintus Flamininus proclaimed the freedom of Argos.

NEMESIANUS, **Marcus Aurelius Olympius**, a Latin poet of the latter half of the 3d century A. D., supposed to have been a native of Africa. He was the most successful poet at the court of the emperor Carus, and wrote on fishing, hunting, and aquatics; but all his works have perished except a fragment of the *Cynegetica*, on hunting, consisting of 325 hexameter verses, remarkable for neatness and purity of style. It was first printed at Venice in 1534; the best edition is that of Stern (Halle, 1832).

NEMESIS, in Grecian mythology, a daughter of Night, though sometimes called a daughter either of Erebus or of Oceanus. She was a personification of conscience, and is mentioned by Hesiod in connection with *Ædos* (Shame). It was believed by the Greeks that the gods were enemies of excessive human happiness, and that there was a power which preserved a proper compensation in human affairs, from which it was impossible for the sinner to escape. This power was embodied in Nemesis, who was in a special manner the avenger of family crimes and the humbler of the overbearing, and was particularly worshipped at Rhamnus, Patræ, and Cyzicus. She was usually represented in works of art as a virgin, sometimes standing in a thoughtful attitude, holding in her left hand a bridle or branch of an ash tree, and in her right a wheel with a sword or scourge.

NEMESIUS, bishop of Emesa, a Greek philosopher who flourished about 400. He has been identified by some writers with another Nemesis, a friend of Gregory Nazianzen, and governor of Cappadocia. Nemesis wrote a complete treatise on anthropology (*Περὶ Φύσεως Ἀνθρώπου*), in which the Neo-Platonic philosophy predominates. He maintains the preëxistence of souls and the freedom of the will, affirms that this world is not to be destroyed, and denies the existence of a world-soul and the transmigration of spirits. Passages of this work are considered by some modern writers to indicate a knowledge of the circulation of the blood and the functions of the liver. It was first attributed to Gregory Nazianzen, and a Latin translation of it was published under his name by Burgundius Pisanus (fol., Strasbourg, 1512), and a second Latin translation by Giorgio Valla (Lyons, 1538). The Greek text, with the true authorship, was published separately by Nicasius Ellebodus (Antwerp, 1565), by Matthäus (Halle, 1802), and in vol. xl. of Migne's *Patrologie grecque*. There are translations into English by George Wither (London, 1636), into German by Osterhammer (Salzburg, 1819), and into French by J. B. Thibault (Paris, 1844).

NEMI (anc. *lacus Nemorensis* and *Speculum Dianæ*, mirror of Diana), a lake of Italy, 17 m. S. E. of Rome, famous in antiquity for a temple of Diana. This was situated 3 m. from Aricia (now La Riccia), an ancient city of Latium, which thence received the surname *Nemoralis*. On the N. E. shore of the lake is the village of Nemi, on the site of the ancient town of Nemus. Lake Nemi is smaller than Lake Albano, and of a more regular shape, and is surrounded in every direction by steep, high, and wooded hills. It was once the crater of a volcano. The lake has no visible natural outlet, the waters being carried off by an ancient artificial passage. It is a favorite subject of painters.

NEMOURS, Louis Charles Philippe Raphaël d'Orléans, duke de, a French prince, the second son of Louis Philippe, born in Paris, Oct. 25,

1814. He was in February, 1831, elected king of the Belgians by the national congress assembled at Brussels, but his father prohibited him from accepting the crown. He served in the Belgian campaign of 1831, and subsequently in Algeria, where he gained in 1837 the rank of lieutenant general. The chamber declined in 1840 to grant him 500,000 francs, which led to the overthrow of the Soult cabinet. He married in the same year the princess Victoria of Saxe-Coburg-Gotha. In 1841 he returned to the army in Algeria. The death of his elder brother, the duke of Orleans (July 13, 1842), led to a proposition, which was not adopted, to make him regent in the event of his father's death. On the outbreak of the revolution of 1848 he accompanied the duchess of Orleans on her fruitless errand to the chamber, and subsequently he remained with the rest of the Orleans family in England till 1871, when they were permitted to reside in France. The duchess died Nov. 10, 1857, leaving two sons: the count d'Eu, husband of the presumptive empress of Brazil, and a marshal in the Brazilian army; and the duke d'Alençon (born at Neuilly, July 12, 1844), a naval officer, who married a Bavarian princess in 1868. The princess Marguerite, the eldest of the duke's two daughters, married the Polish prince Ladislas Czartoryski, Jan. 15, 1872.

NENA SAHIB. See **NANA SAHIB**.

NENNIUS, a doubtful British historian, supposed to have flourished in the early part of the 9th century, though Vossius places him in the 7th. According to several passages of the work attributed to him, he was a monk of Bangor in Wales. This work is entitled *Historia Britonum*, or *Eulogium Britannia*, and relates the history of Britain from the arrival of Brutus the Trojan, grandson of Æneas, to A. D. 655. The best edition is that of Stevenson (London, 1838). An English translation by the Rev. W. Gunn has been republished in Bohn's "Antiquarian Library" (London, 1848).

NEOGRAD. See **NÓGRÁD**.

NEO-PLATONISM, a system of philosophy and theosophy whose original seat was Alexandria, where it sprang up toward the end of the 2d century. Its founder was Ammonius Saccas, who was brought up by his parents in the Christian faith, but renounced it and became a Hellenist. He died A. D. 243. His most distinguished disciples were Plotinus, Longinus the philologist, and two Origenes, one of whom surnamed Adamantius was the famous father of the church. About two centuries earlier Philo, an Alexandrian Jew, born probably a few years before Christ, had promulgated a system by which he sought to reconcile the philosophy of Plato with the teachings of Moses. He held that the Hebrew Scriptures contained an internal sense in which were hidden all the doctrines of the Greek philosophy. (See **PHILO JUDÆUS**.) Ammonius endeavored to reconcile the doctrines of Aristotle with those of Plato, and both with Christianity, and hence

his school was called eclectic. He taught that God is primarily essence, and secondarily knowledge and power, and that asceticism is the true way to attain to a knowledge of the infinite. Little however is known of his teachings, as he left no writings, and his disciples bound themselves not to divulge his doctrines. Plotinus was the first to put the new philosophy into writing, and to teach it at Rome, where he went to live in 244. He taught that the One or the Good, which with Plato was the highest of the Ideas, is elevated above the sphere of the Ideas, and above all the objects of rational apprehension, and that the Ideas, to which Plato ascribed independent existence, are emanations from this One, the soul an emanation from the Ideas, and so on. The One, or the Good, is neither reason nor an object of rational cognition. From the excess of its energy it sends forth an image of itself. This image is *Nous* or mind. The *Nous* in turn produces as its image the soul which exists in it, as itself exists in the One. The body is in the soul and depends on it; but the soul is absolutely separable from the body, not only in its thinking power, but also in its lower faculties. It precedes and survives the body. The business of man is to return to God, whom he as a sensuous being has estranged from himself. The means for this return are virtue, philosophic thought, and above all the ecstatic intuition of God and the becoming one with him. Prominent among the disciples of Plotinus was Porphyry, who died about 304. He appears to have taught more distinctly than his master the doctrine of the emanation of matter from the soul. He also maintained that the world was without beginning in time. He attacked Christianity, and especially the divinity of Jesus. Iamblichus, who died about 330, employed the Neo-Platonic philosophy in support of paganism, and relied more on Pythagorean speculations as to the mystical powers of numbers than on Platonic ideas. Among his disciples was the emperor Julian the Apostate. The attempt to overthrow Christianity and revive paganism failed, and the Neo-Platonists now applied themselves to scientific studies, and especially to commentaries on Plato and Aristotle. Proclus was the most important of these later writers.—Some writers give to Neo-Platonism a much wider scope than that of the school of Ammonius and his disciples. They include in it not only Philo-Judeus, but several of the Christian fathers besides Origen, as for instance Clement of Alexandria, Gregory Nazianzen, and Cyril of Alexandria. (See ALEXANDRIAN SCHOOL.)

NEOPTOLEMUS. I. The son of Achilles and Deidamia, originally called Pyrrhus from his red hair. When it was prophesied that Troy could not be taken without the aid of the son of Achilles, Ulysses and Diomedes were sent to bring him thither. He was one of the warriors concealed in the wooden horse. He slew Priam, sacrificed Polyxena on the tomb of

Achilles, and married Andromache, who bore him several sons. II. An officer of Alexander the Great, who first distinguished himself at the siege of Gaza in 332 B. C. After the death of the conqueror, Armenia was assigned to Neoptolemus. When the Macedonian generals took up arms to contend for the empire, he refused to support Perdiccas, and he was finally killed in battle by Eumenes.

NEOSHO, a S. E. county of Kansas, intersected by the Neosho river; area, 576 sq. m.; pop. in 1870, 10,206. It is traversed by the Missouri, Kansas, and Texas, and the Leavenworth, Lawrence, and Galveston railroads. The surface is undulating or level, and the soil is fertile. The chief productions in 1870 were 27,466 bushels of wheat, 199,997 of Indian corn, 48,241 of oats, 27,522 of potatoes, 59,025 lbs. of butter, and 4,943 tons of hay. There were 1,981 horses, 2,257 milch cows, 5,589 other cattle, 1,712 sheep, and 2,700 swine. Capital, Erie.

NEPAUL, an independent kingdom of India, bounded N. by the Himalaya mountains, which separate it from Thibet, E. by the British district of Darjeeling and the protected native state of Sikkim, and S. and W. by Bengal, Oude, and the Northwest Provinces. It is included between lat. 26° 25' and 30° 15' N., and lon. 79° 45' and 88° 20' E.; length W. N. W. and E. S. E. about 500 m., greatest breadth 150 m.; area estimated at 50,000 sq. m.; pop. estimated at 2,000,000. The largest town is Katmandu, the capital. Nepaul is intersected by several large rivers, some of which have their sources on the table land of Thibet, beyond the Himalaya, through which they force their way by narrow chasms of great depth. The three great river systems of Nepaul comprise the Gogra and its tributaries in the west, the Gunduk and its feeders in the middle region, and in the east the alpine basin of the Coosy or Cosi. There are very few lakes in the country. The greater part of the kingdom belongs to the Himalaya region, which presents a succession of vast ridged mountain slopes with narrow glens between them; but the Nepaulese territory also includes a tract about 20 m. in width lying within the plain which stretches southward from the base of the mountains. In respect to elevation the country is naturally divisible into a lower region, extending from the great plain of India to a height of 4,000 ft. above the sea level; a central region, comprising all between 4,000 and 10,000 ft.; and an upper region, reaching thence to the highest peaks. There are several summits of stupendous height, among which is Mt. Everest (29,002 ft.), the highest known mountain in the world. From the N. boundary, which lies within the limit of perpetual snow, the elevations gradually sink into lower and lower hills, among which lies the great valley of Nepaul, in which is situated the capital. It is 4,500 ft. above the sea, measures 16 m. in each diameter, and is watered by the Bagmutty

river, flowing southward. At the foot of these hills a belt of forest occurs, running E. and W. throughout the length of the country, and reaching within 10 m. of the S. frontier. Although a dry region, this line of forest is exceedingly malarious. It is rich in valuable timber, of which the saul tree is the most important. Succeeding this on the south is the Terai or Tarai (a Turanian word signifying lowlands), a black, level, humid, malarious region, from 10 to 20 m. broad, skirting the frontier of the Bengal provinces and Oude, an open waste covered with heavy grass. The Terai, the forest belt, and a low sandstone range just above the latter, all belong to the lower region of elevation, throughout which malaria prevails. Above these tracts the climate is remarkably equable and healthful. During the N. E. monsoon, from October to March, the weather is cold and dry, while it is wet and hot from April to September, during the prevalence of the S. W. monsoon. In the central region the temperature for months at a time will vary but a few degrees from 55° F. While these are the general characteristics of the climate, great differences, due to variations of altitude and local causes, will be found between different districts. The geological formation of the central region consists of granite, gneiss, and schists. Iron, lead, copper, and sulphur are found; and gold and silver have also been said to exist, but it is thought that they are very scarce if not entirely wanting. The soil is remarkably rich, and the productions vary with the degrees of elevation. The bamboo, rattan, sugar cane, pineapple, and various other tropical fruits between the ridges of the hills and mountains, in the lowlands, give place to the oak, pine, barley, and millet, as the country rises toward the interior. Much land is cultivated in terraces, great attention being paid to its irrigation. Rice, maize, wheat, cotton, three kinds of pulse, and tobacco are grown. Rice is the staple food; several varieties of it are cultivated in cold and dry places, and even where snow falls. Various roots and herbs form a considerable part of the sustenance of the poorer inhabitants. The number of horned cattle is not great, but there are large flocks of sheep, some of great size with fine wool, from whose milk the Nepaulese make cheese. Horses are brought from Thibet. Among the wild animals, the elephant, the tiger, the leopard, deer, antelopes, and monkeys are found in the lower region; the sun bear, wild cats, and wild dogs, in the middle region; and in the upper region, the Indian bull (*bos gauris*), the true bear, wild goats, wild sheep, ounces, and foxes. The woods are inhabited by great numbers of peculiar birds, and the rivers are abundantly stocked with fish.—The inhabitants consist of a variety of races, the dominant people being the Gorkhas, a tribe of Mongol origin, Hindoos in religion, who conquered the country about the close of the 18th century. They have enlisted in large numbers

in the British Indian army, and their services during the sepoy mutiny of 1857, particularly at the siege of Delhi, have caused them since to be regarded as valuable soldiers. They are faithful and courageous, though not very capable of endurance. (See GORKHAS.) Many Hindoos from Chitore settled in Nepal at the time of the Mohammedan invasion, and some of them have preserved their blood pure to the present time, while others have intermarried with Chinese and Tartars. The Hindoos are found chiefly in the west; the east is populated by aboriginal tribes, among which are the Newars, Magars, Gurungs, Jariyas, Dhenwars, Booteas, Mhanjees, and Bhanras. The Newars, who are the most important of these, are an industrious agricultural and commercial people, more advanced in the mechanical arts than the mountain tribes, ingenious and peaceable, excessively dirty, of middle size and great strength, with round flat faces, small eyes, broad noses, and open countenances. They are Buddhists, but have a priesthood of their own, and reject the Thibetan model of Buddhism which prevails among the other aboriginal tribes of Nepal. Most of their arts appear to have been introduced from Thibet. Polyandry prevails to a limited extent. Thirteen dialects are spoken in the kingdom, of which but two possess any literature: the Newari, or language of the Newars, and the Parbattia, an Indian Prakrit, spoken by the Gorkhas. Some coarse cotton cloth is made, and the natives work very well in iron, copper, and brass, and are good carpenters, though they never use the saw. The trade of the country is not of much importance, being injured by numerous government monopolies. A considerable quantity of timber is floated down the rivers, and finds a market principally at Calcutta. The government is strictly despotic, and essentially military in its character. Every male inhabitant is liable to military duty for one year, and there is a standing army of about 35,000 men, armed and disciplined in some measure after the model of European troops.—Of the history of Nepal little is known until the invasion of the Gorkhas (1768); it seems never to have been subject to the Moguls or any other great Asiatic conquerors. A war in which it became involved with Thibet in 1790 led to hostilities with the emperor of China, who, regarding himself as the protector of the lamas, in 1792 sent an army of 70,000 men against the Nepaulese and checked the extension of their territory to the northward. A treaty of commerce was concluded with the British in 1792, and from 1802 to 1804 a political resident at the court of Katmandu represented the British government. In the mean time the country had been a prey to intestine feuds, during which it is remarkable that its boundaries were enlarged on all sides, except toward Thibet. In consequence of the repeated encroachments of the rajah upon the East India company's territories, the

British declared war in 1814, and invaded the country on the W. frontier, where their troops met with repeated losses, and their commander, Gen. Gillespie, was slain. In the following year, however, the campaign under Sir David Ochterlony was attended with very different results. The victory of Malown, the capitulation of the famous Nepaulese commander Ameer Singh, and finally the rapid advance of the victors toward Katmandu, obliged the Nepaulese monarch to make peace, and a treaty was signed very favorable to the British in March, 1816. Throughout the mutiny of 1857 the Nepaulese cultivated the friendship of the British, and the prime minister Jung Bahadur defeated the last remnant of the rebels in December, 1859. The policy of the government toward foreigners, however, is exceedingly exclusive.—Much valuable information concerning the country is contained in the work on Nepaul and Thibet by B. H. Hodgson, formerly British minister at Katmandu (1874). See also Oliphant, "A Journey to Katmandu" (1852).

NEPENTHE (Gr. *νῆς*, not, and *πένθος*, grief), a soothing drug known to the Egyptians, from whom, according to Homer, Helen learned the art of compounding it. According to Diodorus Siculus, the Theban women also possessed the secret of its preparation.

NEPENTHES, in botany. See **PITCHER PLANTS**.

NEPHRITE. See **JADE**.

NEPOMUCEN, **John**, or **John of Nepomuk**, a saint of the Roman Catholic church, born at Nepomuk or Pomuk, Bohemia, about 1330, died in Prague in 1383 or 1393. He graduated at the university of Prague, and was successively rector of the church of St. Gall in Prague, canon of the metropolitan chapter, and rector of Tein. In 1378 he was chosen court preacher by the emperor Wenceslas, and appointed almoner and chaplain to the empress Johanna. He was imprisoned for reproving the emperor's cruelty, and was offered his liberty on condition of revealing to Wenceslas the confession of the empress. Refusing to do this, he was inhumanly tortured. Being released at the solicitation of Johanna, he was urged anew to disclose the desired secret, and finally, bound hand and foot, was cast into the Moldau. The body was taken from the river and buried amid a vast concourse and universal grief. The miracles said to be performed at his tomb attracted pilgrims from all parts. He was regarded as a martyr by the Bohemians, and was canonized by Benedict XIII., March 19, 1729, and designated as the patron saint of Bohemia. His festival is celebrated on May 16. Since his canonization several writers have contested the authenticity of the facts recited in the legend of John Nepomucen. Some maintain that two personages named John of Nepomuk existed nearly at the same time; and that a great similarity in the circumstances attending their death caused much confusion in the popular traditions concerning them.—See Berg-

hauer, *Protomartyr Penitentia* (Augsburg, 1736); Marne, *Vie de St. Jean Nepomucène* (Paris, 1741); Pubitschka, *Ehrenrettung des heiligen Johannes von Nepomuk* (Prague, 1791); and Abel, *Die Legende des heiligen Johannes von Nepomuk* (Berlin, 1855).

NEPOS, **Cornelius**, a Roman author, probably a native of Verona or its vicinity, died in the reign of Augustus. Nearly all his works have perished. He wrote *Chronica*, an epitome of universal history; *Exemplorum Libri*, a collection of remarkable sayings and doings; *De Historicis*, and *De Viris Illustribus*. Two of the lives comprised in the last named work, those of Cato and Atticus, are extant. The well known *Excellentium Imperatorum Vitæ*, first printed at Venice in 1471, and long ascribed to Æmilius Probus, is now considered an abridgment by him of the work of Nepos. It has passed through numberless editions, and has been translated into most European languages.

NEPTUNE (**NEPTUNUS**; called by the Greeks Poseidon), in mythology, the principal god of the sea, and originally also of the rivers and springs. He was a son of Saturn and Rhea, and a brother of Jupiter, Pluto, Ceres, Vesta, and Juno. Like his brothers and sisters, he was swallowed by his father as soon as he was born, and thrown up again; or according to another account, his mother saved his life by hiding him among a flock of lambs, and offering to Saturn a young horse to which she feigned to have given birth. After Jupiter had overthrown his father, the empire of the sea fell by lot to Neptune. He is represented as being of equal dignity with his brother Jupiter, but of inferior power, though he sometimes threatened him, disputed the possession of Ægina with him, and once conspired against him. His palace was in the sea, near Eubœa, and he was the especial ruler of the Mediterranean. He assisted in building the walls of Troy, and being refused the reward promised by Laomedon, ever after bore an implacable hatred to the Trojans, and in the war against Troy sided with the Greeks, often fighting on their side, causing the earth to tremble, and encouraging them with the signs of his favor. He had power over the clouds and storms, over ships and mariners, and over all other sea divinities. He was the creator of the horse, and the teacher of horsemanship. There were many legends about him: with Jupiter he fought against Saturn and the Titans; he crushed the centaurs under a mountain in Leucosia; and he sought the hand of Thetis, but refused it through fear when Themis foretold that the son of Thetis would be greater than his father. The wife of Neptune was Amphitrite, by whom he had three children, Triton, Rhode, and Benthesicyme, besides a large number of other children by divine and mortal women. He was worshipped in Argolis, in the Corinthian isthmus, and in Ionia, and had a temple in Rome, in the Campus Martius. The sacrifices

offered to him were bulls, bears, rams, and bridled horses, and horse and chariot races were held in his honor. He had many surnames in allusion to his various attributes. In works of art his emblems are the trident, the horse, and the dolphin; and he is portrayed sometimes in a state of calm, sometimes in agitation, corresponding to the different aspects of the sea over which he presides.

NEPTUNE, the most distant known planet, and the eighth in order of distance from the sun, omitting the asteroids. Neptune travels at a mean distance of about 2,745,998,000 m. from the sun. The eccentricity of his orbit is less than that of any other in the solar system (excluding the asteroids) save that of Venus. It amounts only to 0.008720; that is, his greatest, mean, and least distances are proportional respectively to 1.008720, 1, and 0.991280. But though the eccentricity itself is small, yet the distance of Neptune is so enormous that the actual displacement of the centre of his orbit measured in miles is considerable. His greatest distance from the sun amounts to 2,771,190,000 m., his least to 2,720,806,000 m., and the linear eccentricity amounts to 25,592,000 m. As the earth's mean distance from the sun is 91,430,000 m., the distance of Neptune from the earth varies between 2,863,000,000 and 2,629,000,000 m. The inclination of his orbit to the plane of the ecliptic is $1^{\circ}47'$. He travels around the sun in a mean sidereal period of 60,126.7200 days or 164 tropical years and 226.8 days. So slow is his motion around the sun that his synodical period only exceeds a year by 2.25 days; that is to say, in the course of one year from opposition he advances through so small an arc that the earth overtakes him and he is again in opposition in 24 days. His diameter is estimated at about 37,000 m., though very little reliance can be placed on any telescopic measures of so distant an orb. His volume exceeds the earth's about 105 times; but his density (assuming his diameter to be correctly estimated) is only 0.16 of that of the earth; accordingly his mass only exceeds that of the earth about $16\frac{2}{3}$ times.—The most interesting part of the history of this planet is that which relates to its discovery, which cannot but be regarded as among the greatest triumphs of astronomy. After Uranus had been watched for about a quarter of a century, it was noticed that the path pursued by this planet was not strictly in accordance with calculations in which the perturbations produced by Jupiter and Saturn were duly taken into account. Accordingly Bouvard, the author of excellent tables of the three planets, Jupiter, Saturn, and Uranus, expressed the opinion that a planet of considerable size exists outside Uranus, and by its action on Uranus produced these perturbations. The Rev. T. J. Hussey of Hayes seems even earlier to have adopted this view, and he wrote in 1834 to Sir G. B. Airy, the present English astronomer royal, suggesting that the external planet might be detect-

ed by its action. Airy replied that he did not think the irregularity of Uranus was in such a state as to give the smallest hope of making out the nature of any external action on the planet. He expressed his belief also that there was no such action, and that the earlier observations of Uranus must have been erroneous. In 1837 and in 1842 the astronomer royal was again addressed by E. Bouvard, nephew to the Bouvard just named, and by Bessel, on the subject of an external planet, but he expressed the same opinion as before. In 1844 Prof. Challis applied to Airy for the Greenwich observations of Uranus, for "a young friend of his, Mr. J. C. Adams, who was at work on the theory of Uranus." These were sent, and in September, 1845, Challis wrote to say that "Mr. Adams had completed his calculation of the perturbations of Uranus by a supposed ulterior planet." In October, 1845, Adams left his paper with Airy, in which the place was indicated where the new planet would probably be found. Airy seems to have placed little reliance on the calculations of Adams, who in fact had then but recently taken his degree, and took no measures to verify his calculations. In June, 1846, Leverrier published his own independent calculation of the place of a disturbing planet, very nearly agreeing with the place assigned by Adams in 1845. Then Airy admitted that Adams might after all have accomplished the task which he himself had deemed beyond the power of any mathematician; and at his request Challis undertook to search for the new planet. He actually saw it, yet failed to recognize it. In the mean time Dr. Galle of Berlin had found the planet on Sept. 23, 1846. The announcement now made by Airy that Adams had anticipated Leverrier in the calculation of the place of the disturbing planet led to angry complaints from Arago and some other French astronomers. But of course no doubt exists as to the justice of the claim made, when too late, for Adams; in fact Airy admitted that "a publication of the elements of the planet's orbit obtained in October, 1845" (from Mr. Adams) "might have led to the discovery of the planet in November, 1845." The planet eventually received the name Neptune. It was found to have a distance far less than either Adams or Leverrier had hypothetically assigned to it (following Bode's law). In fact, instead of having a distance represented by 388 (where the earth's distance is 10), the actual mean distance of Neptune amounts to only 300. The motions and period of a planet at this mean distance are quite unlike those of the hypothetical planet of Adams and Leverrier; and Prof. Peirce of Harvard college published in 1848 a paper tending to show that the success of the two European mathematicians was merely a lucky accident. In one sense this was doubtless true. Fifty years hence the position of Neptune will be utterly unlike that which the hypothetical Neptune would by that time

have reached. But as the calculations of Adams and Leverrier were based on the perturbations produced by Neptune while traversing but a small portion of his orbit, and as his apparent position in that portion is nearly the same as that of the hypothetical Neptune, it does not appear that the credit due to Adams and Leverrier can be appreciably diminished. Were it not, indeed, for the lucky chance that a planet's action could explain the observed discrepancies, whether that planet moved in the actual or hypothetical orbit, neither Adams nor Leverrier could have solved the problem without first abandoning their estimate of the mean distance. But it has not been shown that in this case they would not have modified their assumption to correspond with the facts before them. An investigation of the orbits of Neptune and Uranus, with general tables of the planet's motions, has been published by Prof. S. Newcomb in the "Smithsonian Contributions to Science" (May, 1865, and October, 1873). In these papers he discusses the elements of the orbit of Neptune, the existence of an extra-Neptunian planet, the theoretical place of the planet between the years 1600 and 2000, and many other questions of great interest, with a profundity and elegance which has elicited the highest commendation. At least one satellite attends on Neptune, discovered by Mr. Lassell of Liverpool in 1847. It travels around the planet in a period of 5d. 21h. 8m., at a distance from his centre equal to 12 times his estimated radius, the maximum observed elongation of the satellite from Neptune's centre amounting to 18".

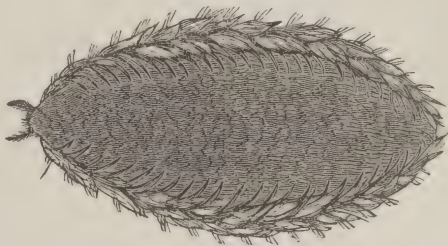
NÉRAC (anc. *Neracum*), a town of France, in the department of Lot-et-Garonne, on the Baise, 16 m. S. W. of Agen; pop. in 1866, 7,717. The new town is handsome, and larger than the older part, with which it is connected by stone bridges. Nérac contains a large church and several other public buildings, and a statue of Henry IV., who spent a part of his youth here. It has manufactures of various articles, especially corks for wine bottles. It was once the capital of the duchy of Albret, and has interesting relics of an old castle where Margaret of Navarre held her court, and where Calvin and other eminent reformers found an asylum. The former royal park now forms the promenade of La Garenne.

NERBUDDA, a river of Hindostan, which rises about lat. 22° 40' N., lon. 81° 50' E., nearly 3,500 ft. above the sea, and after a course of 800 m., generally W., through the Central Provinces, Indore, and Bombay, falls into the gulf of Cambay about lat. 21° 40' N., lon. 73° E. During the rains it rises in some places 70 ft. and in others 20 above its level in the dry season. The Nerbudda has no tributaries worthy of notice. There are extensive forests on its banks. It flows rapidly, and in Malwa its channel is worn to a great depth through columnar basalt. The upper part of its course is obstructed by numerous rapids and falls.

Near the foot of the Vindhya hills the Holkar State railway crosses the Nerbudda by means of an iron bridge 2,755 ft. long, resting on 13 brick piers.

NEREIDS, in mythology. See **NEREUS**.

NEREIDS, the name of the sea centipedes of the dorsibranchiate order of annelids, of which the genus *neréis* (Cuv.) is one of the best known forms. The class and ordinal characters are given under **ANNELIDA**. In the true nereids the tentacles are of even number; there is a single pair of maxillæ in the proboscis; the branchiæ are small plates in which a network of blood vessels is disposed; each of the numerous feet has two tubercles, two bundles of bristles, and an under and an upper cirrus; the body is like that of a centipede, with many joints. They are active, crawling and swimming with facility; some live in crevices in rocks near the shore, in sponges, corals, deserted shells under stones, or wherever they can find a shelter; others burrow in mud or sand, occasionally making tubes or sheaths, from which they protrude the anterior part of the body, and into which they retreat quickly when alarmed; some of the tropical species



Common Sea Mouse (*Aphrodita aculeata*).

are very large, and vividly phosphorescent at night. Their food consists of living and dead animal substances, such as marine worms and soft-bodied invertebrates. The species are numerous, and are found on almost all coasts.—The sea mice (*aphrodita*, Linn.) belong to the same order; the body is broad and flat, with two longitudinal rows of wide membranous scales covering the back and concealing the branchiæ. The common sea mouse (*A. aculeata*, Linn.) is 6 or 7 in. long and 2 broad, the back covered with a flax-like substance in which are mixed spines and softer bristles, the latter shining with all the tints of the rainbow, and rivalling in beauty the lustre of the humming bird or the sparkling of the most brilliant gems.

NEREUS, a marine divinity in Greek and Roman mythology, son of Pontus and Gæa (or, in the Roman myth, of Oceanus and Terra), and husband of Doris, who bore him 50 daughters, the Nereids. Nereus was represented as a benevolent, wise, and gentle old man, one of the most unerring prophets among the minor divinities. He dwelt at the bottom of the sea (according to most authors, of the Ægean sea,

over which he especially ruled). His attribute was the trident, and he frequently appears in ancient works of art.—The Nereids were the nymphs of the Mediterranean, as the Naiads were of the fresh water, and the Oceanides of the outer ocean. Their individual names are given by several authors, but are not always the same in different passages. They were represented as beautiful girls, generally grouped about the cars of marine divinities, or in dances or revels with tritons and monsters; sometimes they are represented as mermaids. They were thought to be especially propitious to sailors, and were widely worshipped in the Greek seaports. Perhaps the most celebrated of the Nereids was Thetis, the wife of Peleus and mother of Achilles.

NERI, Filippo de' (commonly called in English St. PHILIP NERI), a saint of the Roman Catholic church, born in Florence in July, 1515, died in Rome, May 26, 1595. He was the adopted heir of a rich uncle, but secretly left his house and went to Rome, and while fulfilling there the duties of tutor studied philosophy, theology, and canon law. In 1538 he sold all that he possessed, distributed the proceeds among the poor, and devoted himself to serving the sick in the hospitals and the pilgrims who flocked to Rome. He founded, with the help of Ignatius Loyola, a guild of nobles, to provide hospitality for pilgrims, and obtain lodging and work for destitute young people. In June, 1551, he received holy orders, took up his abode in the monastery of San Girolamo, and gave his whole time to instructing youth and children. Several young clerics joined him in this labor, and stationed themselves each morning and evening on Sundays and festivals before the door of some church, rang a bell to attract the crowd, sang psalms and hymns, or persuaded people to enter the chapel. To make these assemblies more attractive, he invited the most eloquent men to preach, and the best singers and musicians volunteered their services. He had dramas, with music, on Scriptural subjects, performed in an adjoining monastery. The efforts of the guild were next directed to securing permanent employment for the reclaimed. The aid of such companions as Baronius and Salviati, afterward cardinals, enabled Philip to found a society of priests, called from their prayer meetings and sacred concerts "the Priests of the Oratory," which soon had branches in many cities. This foundation was approved by Gregory XIII. in 1575. (See ORATORIANS.) Philip was canonized in 1622 by Gregory XV., and his feast is celebrated on May 26. His literary remains consist of letters, poems, and advice to youth.—See F. W. Faber, "Spirit and Genius of St. Philip Neri" (London, 1850).

NERIUM. See OLEANDER.

NERO, a Roman emperor, born at Antium on the coast of Latium, probably Dec. 15, A. D. 37, died by his own hand, June 9, 68. He was the son of Cneius Domitius Ahenobarbus,

by Agrippina, the sister of Caligula, and his original name was Lucius Domitius Ahenobarbus. When he was 12 years of age his mother married her uncle the emperor Claudius, who four years afterward gave his daughter Octavia to Nero in marriage, having formally adopted him under the name of Nero Claudius Caesar Drusus Germanicus. Under the care of the philosopher Seneca he is said to have made some progress in learning, and in his 16th year he delivered an oration in Greek in behalf of the inhabitants of Ilium and Rhodes. In 54 the murder of Claudius by Agrippina placed him on the throne, his mother causing the emperor's death to be kept secret until he could be safely proclaimed by the soldiers. The senate and the provinces at once submitted to him, and no attempt was made to secure the purple for Claudius's own son Britannicus, who was four or five years his junior. The first five years of his reign were distinguished for clemency and justice, though his private life was from the first extremely licentious. The conduct of affairs was left principally to Seneca and Burrhus, under whose influence many reforms were introduced into the state, and Nero daily rose in popularity; but the jealousy of Agrippina, who found herself shut out from power, soon overthrew the ascendancy of Seneca, though it did not establish her own. She threatened to disclose the circumstances of Claudius's death, and to incite the legions to support the claims of Britannicus; she abused Nero and upbraided him for his disgraceful amour with a low-born woman named Acte. Nero retaliated by causing Britannicus to be poisoned, and by plunging into still lower depths of immorality. In company with other dissolute young men he roamed the city by night, beating and robbing passengers and breaking into houses. One of his boon companions was Otho, with whose beautiful but profligate wife Poppæa Nero became enamored, and sent Otho to Lusitania to get him out of the way; but Poppæa, who aspired to share the imperial throne, encountered in Agrippina an enemy who thwarted all her plans. Persuading the emperor that his mother entertained designs upon his life, she finally procured an order for her assassination (59), and her death was communicated to the senate by Seneca, who was an accomplice in the crime. (See AGRIPPINA.) This was followed by the divorce of Octavia, who was soon afterward put to death, and the marriage of the emperor to Poppæa. In 62 Burrhus died, and Seneca wisely asked leave to retire. Two years afterward a dreadful conflagration raged in Rome for a week, totally destroying three of the 14 districts of the city, and leaving only a few half-ruined houses in seven of the others. Dion Cassius and Suetonius relate that Nero fired it himself, and it is said that, as he watched the progress of the flames from the top of a high tower, he amused himself with chanting to his own

lyre verses on the destruction of Troy. The truth of the story is doubtful, but it was believed at the time, and Nero sought to transfer the odium of the conflagration to the Christians, many of whom he caused to be put to death. Some were covered with the skins of wild beasts and torn to pieces by dogs, and others were crucified and set on fire by night in the imperial gardens, while the emperor drove his chariot by the light of the flames. The tyrant was liberal to the sufferers by the conflagration, and upon the ruins of the old city built a much finer one on a different plan, one of its most striking features being a vast palace for himself, which was called "the golden house," and the cost of which he defrayed by robbery and extortion. The discovery of a conspiracy against him served to develop his ferocity. O. Calpurnius Piso, Plantius Lateranus, the poet Lucan, and Seneca were put to death for alleged complicity in it. The senate was induced to receive the intelligence of their fate as the news of a great victory, and triumphal honors were decreed to the infamous Tigellinus, the emperor's principal instrument. Having killed Poppæa by a kick when she was with child, Nero now proposed to marry Antonia, his sister by adoption, and on her refusal ordered her to be put to death. He then bestowed his hand upon Statilia Messalina, whose husband Vestinus he had assassinated for marrying Messalina after the emperor had cohabited with her. The jurist Longinus was exiled, and the most virtuous citizens were put to death. In the midst of these executions Nero's highest ambition seemed to be to excel in the games of the circus. He visited Greece to display his skill as a musician and charioteer, and the Olympic games were delayed two years (from 65 to 67) that he might be present at them. At the Isthmian games he ordered the death of a singer whose voice overpowered his own. He returned to Rome as a conqueror, entering the city through a breach in the wall, riding in the chariot of Augustus, with a musician by his side, and the 1,800 crowns which he had won at the games displayed as the trophies of his expedition. He had already appeared upon the stage in Rome and other cities of Italy, and chariot racing, music, and every frivolous amusement now engrossed his time. But in the mean while a formidable insurrection was preparing. It broke out in Gaul, under Julius Vindex, governor of the Celtic province, who raised an army and offered the purple to Galba, then governor of Hispania Tarraconensis. Galba accepted the proposal, but the troops of Vindex were defeated before Vesontio (Besançon), and their general was killed. There is little doubt that Galba would have yielded had not Nero, who had reluctantly left his extravagances in Naples to assume the consulship alone at the capital, been deserted by the prætorian guard, condemned to death by the senate, and forced to flee to the house of one of his creatures in the suburbs. Here, after spending in

an agony of fear and irresolution the night and part of the next day, he committed suicide, and died in the presence of the soldiers who had come to seize him. His corpse received an honorable burial from his concubine Acte and two of his nurses.—The military events of Nero's reign were upon the whole glorious to the Roman arms. In Armenia, which had been occupied by the Parthians, a war commenced in 55, and was terminated in 58 by Domitius Corbulo, who destroyed Artaxata, the capital, and captured the city of Tigranocerta, thus rendering the Romans masters of the whole country. Tiridates, the king, who had been set up there by the Parthians, subsequently renewed the struggle, and after temporary successes was compelled to submit and go in person to Rome to do homage for his kingdom. Nero, however, soon afterward condemned Corbulo to death, a sentence which the old soldier anticipated by suicide. In 61 a great rising in Britain under Boadicea was put down by Suetonius Paulinus. A revolt also broke out in Judea, and Vespasian was sent to suppress it; but the history of this war, terminating with the conquest of Jerusalem, belongs to subsequent reigns.

NERO, Claudius. See **CLAUDIUS NERO**.

NERO, Claudius Drusus. See **DRUSUS**.

NERO, Claudius Tiberius. See **CLAUDIUS NERO, TIBERIUS**.

NERO GERMANICUS, Tiberius Claudius Drusus. See **CLAUDIUS I**.

NEROLI. See **ORANGE**.

NERTCHINSK, a town of eastern Siberia, in the province of Transbaikalia, about 530 m. E. of Irkutsk; pop. in 1869, 3,938. The military post of Nertchinsk commands the frontier of China. It is situated on low ground, subject to inundation. Most of the houses are built of wood. It contains churches and schools, and has an extensive fur trade. The first boundary treaty between Russia and China was concluded here in 1689.—The celebrated Nertchinsk government mines are situated 100 m. E. of the town, in the Nertchinskoi mountains. More than 4,000 persons were in former years employed in the silver mines alone. Lead, tin, cinnabar, and zinc mines also exist, and gold was largely produced in the years 1846-'56.

NERVA, Marcus Cocceius, a Roman emperor, born probably in Narnia, Umbria, A. D. 32, died in Rome, Jan. 23, 98. He was twice consul before his accession to the purple, in 71 with Vespasian, and in 90 with Domitian. On the assassination of Domitian, in September, 96, Nerva was proclaimed emperor by the people and soldiers. He discontinued Domitian's prosecutions for treason, discountenanced informers, permitted exiles to return, distributed land among the poor, and made occasional donations of money and corn. By suppressing many public shows and festivals, and diminishing the expense of such as were tolerated, he economized the revenue, and increased the resources of his empire. In the second year of

his reign a conspiracy was formed against him, at the head of which was a descendant of the triumvir Crassus. It was discovered in time; but Nerva having sworn, when accepting office, that no senator should suffer death under his rule, the leader was only banished to Tarentum and the other conspirators were pardoned.

NERVAL, Gérard de. See GÉRARD DE NERVAL.

NERVE (Gr. *νεῦρον*, a string or sinew), a white cord-like bundle of filaments, distributed to sensitive or contractile organs of the body, and capable of transmitting the nervous influence; so called because the Greek anatomists, misled by the aspect of the nerves proper, did not distinguish them from the tendons. Externally a nerve is white and glistening, and of consider-

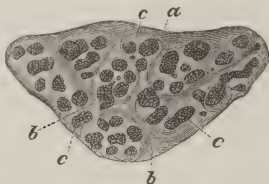


FIG. 1.—Transverse Section of the Ischiatic Nerve.

a. Neurilemma. b. Internal Fibrous Partitions. c. Bundles of Nervous Filaments, cut across.

able toughness and consistency. These qualities are due to its being covered everywhere with a layer of white fibrous tissue, of the same kind as that of the tendons and ligaments, which serves to support the softer parts within and protect them from injury. This protective investment is termed the *neurilemma*. It sends everywhere longitudinal partitions into the interior of the nerve, in which are contained the small blood vessels destined to nourish its tissue, dividing it into a number of parallel passageways or channels, of a nearly cylindrical form. In these channels are contained the nervous filaments or nerve fibres, the essential anatomical elements of the nerve. They are cylindrical filaments, averaging in the main trunks and branches $\frac{3}{1000}$ of an inch in diameter, and consisting of a fine structureless investing membrane, a layer of semi-fluid, transparent, highly refracting substance, the "medullary layer," and a central, soft, faintly granular mass, the "axis cylinder." They are similar to the nerve fibres in the brain and spinal cord (see BRAIN), except that they are larger in size, and are invested by the fibrous neurilemma, which is wanting in the interior of the nervous centres. The presence of the highly refracting medullary layer gives to each filament a distinctly marked double contour, which renders it easily distinguishable under the microscope. The filaments in the interior of the nerve are thus arranged in parallel bundles, each bundle surrounded by its own layer of white fibrous tissue, and the whole surrounded and strengthened by the external investment of neurilemma. As the nerves, after originating from the brain or spinal cord, pass outward toward the organs

to which they are to be distributed, they divide into smaller and smaller branches, and sometimes send to each other reciprocal branches of communication, thus forming nervous plexuses, which have received distinct names, corresponding with their location. Thus we find the cervical plexus in the neck, and the brachial plexus, from which are given off the nerves going to the arm. But in these cases the branching and intermingling of the nerves is only apparent, and is simply due to the separation of certain bundles of filaments from those with which they were previously associated, and their passing off in a different direction. The nervous filaments themselves do not in these instances split up or lose their identity. But when a nerve has finally reached the organ in which it is to be distributed, and when by successive ramification its branches have become reduced to a few filaments each, these filaments themselves divide and multiply, perhaps several times in succession, and often without diminishing very perceptibly in size, although at the point of division they usually exhibit a well marked constriction. The nervous filaments finally terminate by free extremities, both in the muscular and sensitive

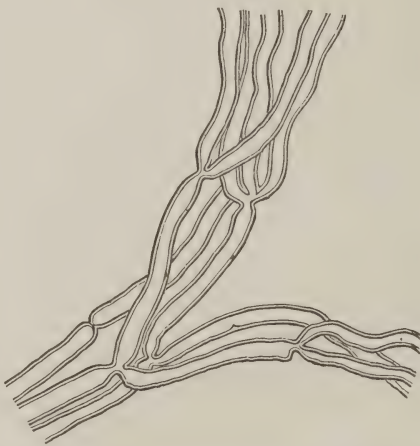


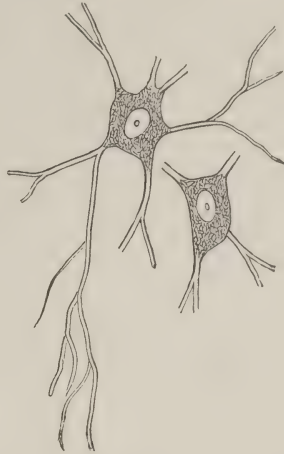
FIG. 2.—Division of Nervous Filaments, from one of the Cutaneous Muscles of the Frog, magnified 350 times.

tissues. In the voluntary muscles the terminal extremity of a nervous filament becomes attached to a muscular fibre, its investing tubular membrane becoming continuous at the point of junction with the sarcolemma, its medullary layer disappears, and its axis cylinder spreads out upon the surface of the contractile substance of the muscular fibre, in the form of a thin, granular, oval spot. In the skin and sensitive membranes generally the ultimate nervous filaments end in minute rounded or ovoid masses termed tactile corpuscles, within which they lose, as in the case of the muscular nerves, their investing membrane and medullary layer, and become reduced to the axis cylinder alone,

which is usually terminated by a slightly rounded extremity.—Nerves are divided into motor and sensitive, according to the preponderance of the two kinds of nervous filaments in their tissue, and whether they are distributed to muscular or sensitive organs. A nerve distributed to muscles is a motor nerve, and its irritation produces a muscular contraction; one distributed to the integument is a sensitive nerve, and its irritation causes a painful sensation. Thus the seventh pair of cranial nerves, or the facial, belongs to the motor nerves, and animates the superficial muscles of the face. The fifth pair, on the contrary, belongs to the sensitive nerves, and communicates sensibility to the integument of that part of the body. In point of fact, however, but few if any of the nervous trunks are exclusively motor or exclusively sensitive, since they generally receive filaments of both kinds, either from their own roots or from other neighboring nerves. Thus the facial nerve has a certain degree of sensibility, which it derives from communications with the fifth pair; and one portion of the fifth pair itself is motor in character, and animates the muscles of mastication. When both kinds of filaments are mingled together in a nerve in similar or nearly similar proportions, it is said to be a “mixed nerve,” and is at the same time motor and sensitive. This is the case with all the spinal nerves, the branches of which are distributed both to the muscles and the integument of the body and limbs.—When cut across, a nerve at once ceases to perform its functions. It can no longer transmit the nervous influence in either direction, and accordingly the parts to which it is distributed become paralyzed and insensible. The nerve may however reunite after such an injury, and its natural functions thus become reestablished. The substance may even be regenerated when a considerable portion has been cut out. This reunion and regeneration of divided nerves takes place most readily in young animals. Vulpian has found the sciatic nerve regenerated, in very young rats, after the excision of a little more than two inches of its length, in 17 days; and in young cats sensibility has returned in the tongue, after excision of one inch of the lingual nerve, in 14 days. In adult animals, however, and in the human subject, a longer time is required for the regeneration of a divided nerve; and the full restoration of its function is often not complete until after the lapse of several months. (See NERVOUS SYSTEM.)

NERVE CELL, a form of animal cell found in the gray nervous matter of the nervous centres (see GANGLION), and also in the peripheral expansion of some of the cranial nerves. Nerve cells are rounded or ovoid-shaped bodies, often with slender, elongated, tapering or branching processes extending from their periphery in various directions. They vary in size from $\frac{1}{4000}$ to $\frac{1}{800}$ of an inch in diameter. They consist of a soft granular substance, usually containing a

considerable quantity of gray pigment, and a well defined round or oval nucleus, with a large and distinct nucleolus. Their branching processes often become continuous with the ul-



Nerve Cells from the Retina of the Ox, magnified 850 times.

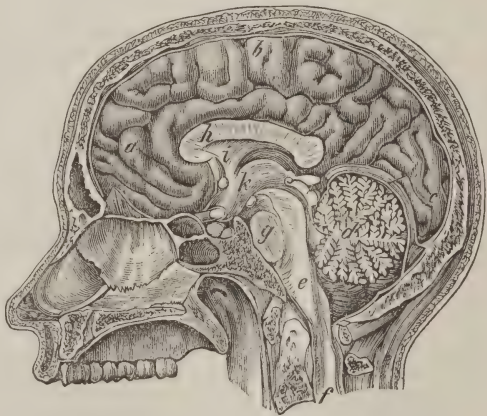
mate nerve fibres, which are mingled in profusion with the nerve cells in the gray substance of nervous centres. They are regarded as the most important anatomical elements of the nervous centres, where nervous power originates, or the nervous impressions are finally received.

NERVII, an ancient people, one of the most warlike tribes of Belgic Gaul. Their territory extended from the Sambre to the ocean, and was partly covered by the Ardennes. Bagacum (Bayay) was their capital, and Camaracum (Cambrai) one of their towns. They claimed a Germanic origin. They joined the Belgic league against Cæsar, and, though numbering 60,000 men capable of bearing arms, were almost annihilated by him (57 B. C.).

NERVOUS SYSTEM. One of the most important and remarkable characteristics that distinguish the physical organization of animals from that of plants, is the existence in the former of a peculiar tissue or substance called nerve. The special endowment of this substance is what is termed sensibility, or that faculty by which an animal is capable of receiving impressions from external objects, and by which consequently it is brought into relation with the surrounding world. In most animals this tissue is so disposed as to form a distinct and complete apparatus called the nervous system. Its development is always in direct relation to the complexity of the physical organization and the degree of physical endowment. In the lowest forms of animal creation the existence of nervous matter is as yet undemonstrated, but it no doubt exists in many species where it has not yet been discovered, owing to the delicacy of its tissues and the imperfect means of observation. The tissue out of which the

nervous system is constructed presents two varieties, described by anatomists as the white or fibrous matter, and the gray, cineritious, or vesicular matter. The white matter is developed in the form of fibres or filaments, bound together in fasciculi or bundles, which constitute what are called nerves; their function is internuncial or conducting. The gray matter is accumulated in masses called centres or ganglia; their office is dynamic, originating the so-called nervous force. (For a more particular description of the microscopical anatomy and chemical analysis of nerve tissue, see BRAIN.)—Examining the nervous system in its comparative development in the animal creation, we find four principal types exhibited in the four great classes radiata, mollusca, articulata, and vertebrata. We will briefly examine these in succession. 1. *Nervous System of Radiata*. In this class we find the simplest form of nervous system, and one which corresponds with the simplicity of the physical organization, the animal being formed by a series of similar parts. Thus in the *asterias* or five-rayed star fish we have a chain of five ganglia surrounding the central mass, or body which contains the mouth and digestive cavity. These ganglia are united to each other by nervous arcs called commissures, and each sends into the ray or limb opposite to which it is placed nervous prolongations. 2. *Nervous System of Mollusca*. In these animals we have several separate and distinct organs, such as a digestive apparatus, a liver, gills, ovaries, and testicles, the male and female functions generally coexisting in the same animal; we have besides a muscular mantle and a foot or organ of locomotion. The necessities of this physical organization are met by a corresponding arrangement of the nervous system. Thus in *aplysia* there is an anterior or cerebral ganglion resulting from the junction of two above the œsophagus; this ganglion represents the brain, and is doubtless connected with whatever sensitive or volitional endowment the animal possesses. From this small nerves pass to form the pharyngeal ganglion, which supplies innervation to the digestive apparatus; from this two nerves pass backward to form the pedal ganglion, which also gives nerves to supply the mantle; and in the posterior part of the body there is an additional ganglion, called the branchial, the nerves of which are distributed to the gills. 3. *Nervous System of Articulata*. In this class we observe that the body is divided into a certain number of similar segments, of which the anterior, called the head, presents the greatest development. The nervous system in this class corresponds to their anatomical structure. Thus in the common centipede, *scolopendra*, the nervous system consists in a double nervous cord running along the ventral surface of the animal, and presenting opposite to each articulation ganglionic enlargements; these ganglia

send off lateral prolongations, which unite with each other on the upper surface of the body, forming a series of circular commissures. At the head there is a ganglion at the point of junction of the lateral prolongations from the infra-œsophageal ganglia, called the supra-œsophageal ganglion, and from this ring or collar arise the optic nerves and the other nerves that are distributed about the head. In insects we find a somewhat more complicated arrangement of the same type of nervous system, and one which presents very important analogies to the nervous system of the vertebrata. It consists in a ganglionic nervous cord, but the ganglia are arranged so as to correspond with the anatomical division of the animal into three distinct cavities, the head, chest, and abdomen. In the head we have the ganglia presiding over the functions of special sense, prehension, and mastication; in the chest those that control respiration and the locomotive organs, the legs and wings; and in the abdomen those that are connected with the digestive and reproductive functions. 4. *Nervous System of Vertebrata*. The nervous system, as we find it developed in the mammalia, the last and highest class of the vertebrata, consists of an axis of nerve matter, called the cerebro-spinal axis, which is enclosed in the cavities of the cranium and spinal canal. This axis is constituted of ganglia and of longitudinal and transverse commissures, and gives off nerves which are distributed to the organs of special sense, of ordinary sensation and motion. This cerebro-spinal axis, however, with its centres, commissures, and nerves, forms but one portion of the nervous system in the ver-



The Brain enclosed in its Membranes, and the Skull.

a, b, c. Convolutions of the cerebrum. d. Cerebellum. e. Medulla oblongata. f. Upper extremity of the spinal cord. g. Tuber annulare. h, i, k. Central parts of the cerebrum.

tebrata, that which presides over the purely animal functions of locomotion, respiration, sensation, and intelligence. A separate and distinct system, called the ganglionic or sympathetic, controls the functions of organic or

vegetative life; its centres are located in the visceral cavities of the body; they are connected with each other by longitudinal and transverse commissures, and send filaments to all the viscera. The cerebro-spinal axis, as it is developed in man, may be briefly described as follows. The principal ganglion is placed at the superior extremity of the axis, and is called the brain or encephalon. This is enclosed in the cavity of the cranium, and is enveloped by three membranes, the pia mater, the arachnoid, and dura mater. The encephalon consists of a series of ganglia connected with each other, and designated, counting from before backward, as: 1, the olfactory ganglia; 2, the cerebrum or hemispheres; 3, the corpora striata; 4, the optic thalami; 5, the tubercula quadrigemina; 6, the cerebellum; 7, the ganglion of the tuber annulare; and 8, the ganglion of the medulla oblongata. The cerebrum and the cerebellum present a convoluted surface; the others are smooth and irregularly rounded. The superior aspect of the brain presents a deep longitudinal fissure, which divides the cerebrum into two lateral halves, called the cerebral hemispheres; these hemispheres, however, are united at their middle by a transverse commissure, designated as the corpus callosum. Upon its inferior surface each hemisphere is seen to be divided into an anterior, middle, and posterior lobe. The remainder of the axis, called the spinal cord, is a cylinder of nerve matter, extending through the entire length of the vertebral canal, where it is enveloped by a prolongation of the membranes of the brain. Upon the anterior and posterior aspects of the spinal cord are two longitudinal fissures, which indicate the two lateral halves of which the organ is composed. From the brain and spinal cord there arise 44 pairs of nerves, perfectly symmetrical in their course and distribution. These nerves are distinguished as cranial and spinal.



The Spinal Cord and Nerves, posterior view.
a. Upper extremity of spinal cord. b. Lower extremity. c. Cervical portion. d. Dorsal portion. e. Lumbar portion.

The cranial nerves, of which there are 12 pairs, are distributed mainly to the organs of sense, and to those of respiration, voice, and speech; they emerge from the skull by the several openings at its base. The spinal nerves, of which there are 32 pairs, arise from the cord by two roots, one from the anterior and the other from the posterior portion. They escape from the spinal canal through the intervertebral openings, and are distributed principally to the voluntary muscles and the integuments of the neck, body, and extremities. The cerebro-spinal axis, or the nervous system of animal life, as it is called in contradistinction to the sympathetic system, or that of organic life, presents certain peculiarities in the several classes of vertebrata which deserve to be briefly mentioned. As we descend in the series of vertebrate animals, we are struck with the difference in the relative size and development of the brain and spinal marrow. The annexed table will show the proportion which the one bears to the other in weight in the four classes:

CLASS.	SPECIES.	Proportion of	
		brain	to spinal marrow.
Pisces.....	Lamprey.....	100	: 750
Reptilia.....	Triton.....	100	: 180
Aves.....	Pigeon.....	100	: 80
Mammalia.....	Mouse.....	100	: 22

The following table shows the relative proportions of the body and brain in the same classes:

CLASS.	SPECIES.	Proportion of	
		brain	to body.
Pisces.....	Lamprey.....	100	: 142,500
Reptilia.....	Turtle.....	100	: 454,500
Aves.....	Pigeon.....	100	: 9,100
Mammalia.....	Mouse.....	100	: 8,500

This diminution in the size of the brain in the lower vertebrata is observed chiefly in the cerebral hemispheres, the centres of the intellectual faculties. A few words will describe some of the more important anatomical differences in the cerebro-spinal axes of the three lower classes of vertebrata. The brain of birds presents a perfectly smooth surface, and is composed of six masses, viz., beginning anteriorly: the two lateral hemispheres, the optic tubercles, the cerebellum, and the medulla oblongata. The cerebellum is compressed laterally and convoluted transversely. The brain of birds has in common with reptiles and fishes certain peculiarities never observed in the brain of mammalia. They are: 1, the absence of the corpus callosum or transverse commissure of the cerebral hemispheres; 2, the separation of the optic tubercles from the hemispheres; and 3, the existence of two ventricles in the optic tubercles. In reptiles, as in birds, the brain is without convolutions. The optic tubercles, instead of being smaller, are sometimes larger than the cerebral hemispheres, and placed as usual behind them. The cerebellum is behind

the optic tubercles, and is generally small. The olfactory nerves are apparently continuous with the anterior or cerebral ganglia. The brain of fishes is composed of lobes placed one behind the other so as to form a sort of knotted cord. The optic tubercles, called also *tubercula quadrigemina*, and the cerebellum, are placed behind the cerebral ganglia, and are larger in proportion to the latter than in reptiles. The spinal cord differs essentially in the different classes of vertebrata only in the number of pairs of nerves which arise from it, this number being always proportioned to that of the vertebrae.—*Functions of the several parts of the Nervous System.* The first question that meets us in this inquiry is: What are the vital endowments of nerves and nervous centres? When we expose and irritate a nerve by chemical, mechanical, or electrical stimulus, we observe no visible change in the nerve itself, but we produce indications of pain and contraction of the muscles to which the nerve is distributed. We infer therefore from the effects of the irritation that it has produced some change in the nerve, or excited in it some vital endowment. This change has been compared to that wrought in a piece of malleable iron by the galvanic current; and the analogy has suggested the term polarity or polar force, as applicable to the condition produced in nerves by the application of a stimulus. This property of nerves, by which they respond to external irritation, producing pain or muscular contraction, is called irritability; and one of its most remarkable characteristics is the instantaneousness with which the effect follows the irritation. This irritability or nervous force, as it is also called, can be excited at the centres and extremities as well as in the course of the nerves. The effects of irritation vary considerably, however, in different parts of the nervous system. There are certain ganglia and nerves, the irritation of which produces effects that are entirely peculiar to themselves. Thus, irritation of the optic tubercles or nerves causes the sensation of light, irritation of the auditory nerve gives rise to the sensation of sound, and irritation of the olfactory and gustatory nerves to the sensations of smell and taste. This difference in the effects produced by the irritation of different nerves is the basis of the division of the nerves into: 1, motor nerves, or those in which irritation produces muscular contraction; 2, sensitive nerves, or nerves of common sensibility, in which irritation is followed by an agreeable or painful feeling, according to the nature or degree of the stimulation; and 3, nerves of special sense, in which irritation excites the peculiar sensations of light, sound, taste, &c. Many sensitive nerves arise from nervous centres in such close proximity to motor nerves, that a stimulus applied to the former will react upon the latter, and produce not only a direct sensation, but what is technically called a reflex action. This property of reflection was supposed by Mar-

shall Hall to reside in special nerves which possessed both an incident and a reflected fibre, or, as they are called, an afferent sensitive nerve leading to the centre, and an efferent motor nerve coming from the centre; these nerves he styled excito-motory. Probably the majority of all the nerves in the body are compound in their constitution; *i. e.*, they are formed of sensitive and motor filaments combined in the same sheath, or fibrous covering, called the neurilemma. There is no appreciable difference to the eye in the structure of sensitive and motor nerves. The difference in their endowments can only be ascribed, in the present state of our knowledge, to the different nature of their central or peripheral connections. It is a remarkable fact that whatever part of a sensitive nerve be irritated, whether it be the centre, the middle, or the extremity, the same sensation will be produced. There are many familiar illustrations of this fact. For years after the amputation of limbs, patients will experience the sensation of fingers and toes; and when the trunk of a nerve is irritated, they will complain of pains or tingling in the extremities. The same law applies to nerves of special sense. Ordinarily their peculiar irritability is excited by stimuli applied to the periphery or ultimate distribution of the fibres; but occasionally, in consequence of disease, we have these special sensations caused by stimulation applied at the centre or origin of the nerves. Thus, disturbance of the circulation in the brain, or the existence of tumors or other local disease in the neighborhood of the centres of the nerves of special sense, gives rise to optical illusions, singular noises, disagreeable odors, &c. The stimuli that excite the nervous force or irritability are of two kinds, physical and mental. Physical stimuli embrace all external excitants of whatever nature—light, heat, sound, odor, and every variety of chemical, mechanical, and galvanic irritant. Mental stimuli result from the exercise of the will and thought. In all voluntary movements the mind is the direct stimulus of the motor nerve; and in certain deranged states of the nervous system, as in hysteria, the mind also seems to affect directly the nerves of sensation so as to excite pain. Motor nerves are never directly excited by physical stimuli. The latter act always on motor nerves through the medium of sensitive nerves, and, as before stated, the actions so produced are termed reflex actions. The most remarkable of the physical stimuli, and the one most analogous in its effects to the stimulus of the will, is galvanism. The effect of this stimulus is muscular contraction, and there are certain peculiarities in its mode of action that are worthy of mention. 1. If the current be made to cross a nerve at right angles to it, no effect is produced; but if it be made to pass along the fibre, for the smallest fraction of an inch, it will excite more or less violent con-

traction of the muscles to which the nerve is distributed. 2. These contractions occur at the moment of making and breaking the current, and not while it is passing. 3. When the current is made to pass from the centre toward the periphery, it is called the direct current; when from the periphery toward the centre, the inverse current; and it is observed that contractions occur at the moment of making the direct current, and at that of breaking the reverse. 4. Continuance of the direct current exhausts the power of the nerve, but the reversal of the current will restore it; hence the value of the interrupted current, obtained from the electro-magnetic machines, as a remedial agent.—*Nature of Nervous Force.*

We can judge of the nature of the nervous force only by its effects. The muscular contraction caused by the irritation of a nerve is due to the development of a peculiar vital force in the nerve structure, which is unlike any of the known physical forces. It bears certain analogies to electricity, and by some authors has been supposed to be identical with it. The reasons for this supposition are: 1, the identity of their effects on muscular fibre; 2, the rapidity of their action without producing any appreciable effect on the parts between the point of irritation and the point affected; 3, the extreme sensibility of nerves to the electric current; and 4, the phenomena of electrical fishes. None of these reasons are sufficient to establish the identity of the nervous and electrical forces, while the experiments of Longet, Matteucci, Prévost, Dumas, and others, showing that the more delicate tests can detect no galvanic current in the nerves, and that they are inferior to some other substances as conductors, prove conclusively that they are essentially distinct and different forces. With regard to the indisputable electrical phenomena that are observed in the torpedo and gymnotus, it is well ascertained that they depend on the existence in these animals of a special organ which generates electricity. The function of nerves, as has been remarked, is internuncial. They possess only limited capacity for the development of nervous force. Their office seems to be to conduct sensations from the periphery to the centre, and impulses from the centre to the periphery. Their connection with a centre is essential for the appreciation of external impressions or the exercise of mental stimulus. The determination of the sensitive or motor character of a nerve is effected by direct experiment on living animals, and by the effects of disease or injury of the nerves. The different properties belonging to the two roots of the spinal nerves were discovered by Sir Charles Bell about 1810, and established by Magendie in 1822. Magendie operated by dividing, in the living animal, first, the posterior roots of the lumbar and sacral nerves, after which sensibility was lost in the corresponding limbs, while the power of motion remained; secondly, the anterior roots only, after which the

power of motion was abolished, but sensibility remained; and finally, at the same time both anterior and posterior roots, after which motion and sensibility were alike destroyed. These experiments have been repeated by numerous observers, and the conclusion is established that the anterior root of each spinal nerve is motor and the posterior sensitive. (For a description of the functions of the encephalic nervous centres and the cranial nerves, see BRAIN.)—*Functions of the Spinal Cord.* The spinal cord consists of two anterior and two posterior columns made up of longitudinal nerve fibres. Each lateral half encloses a crescentic mass of gray vesicular nerve matter. The fibres of the spinal nerves originate from the gray matter within the cord, while others extend longitudinally through the cord, and are connected, either directly or indirectly, with the brain. The discovery of the separate function of the roots of the spinal nerves was the first step in unravelling the important offices of the spinal cord. Experiments on living animals have established the following points in its physiology: 1. That the anterior and posterior columns of the cord correspond in their properties to the anterior and posterior roots of the spinal nerves; for when the anterior column is irritated, convulsive motion is produced in the parts below the point of division; and when the posterior column is irritated, a painful sensation is produced. 2. When the anterior and posterior columns are both divided, it is found that irritation of the portion of the anterior column attached to the brain produces no effect, while irritation of the lower segment causes convulsive action, showing that in the anterior column the nervous force travels from within outward and not from without inward. When, on the other hand, the portion of the posterior column attached to the brain is irritated, pain is produced, while irritation of the portion below the division causes no pain, showing that in the posterior column the nervous force travels from without inward and not from within outward. 3. The motor nerves derived from the right side of the body enter the right lateral half of the cord, and make their connections from below upward on the same side until they reach the medulla oblongata, where they cross over to the left side; the same course is followed by the motor nerves of the opposite side, which pass up the left anterior column till they reach the medulla, when they cross to the right side. This crossing of the motor nerves in the anterior columns of the medulla is termed decussation. The consequence of this arrangement is, that when an injury is inflicted on the right half of the anterior column below the medulla oblongata, the paralysis is on the same side; but when the injury is above the point at which decussation commences, the paralysis will be on the opposite side. 4. The experiments of Dr. Brown-Séquard show that there is a crossed action in the sensitive as well as in the

motor fibres of the cord. The decussation of the sensitive fibres, however, exists through the entire length of the spinal cord, and not in the medulla alone, as in the anterior columns. The effect of this is shown when one lateral half of the spinal cord of a dog is divided; sensation remains on the corresponding side of the body, but is lost on the opposite side.—*Reflex Action of the Spinal Cord.* Thus far the spinal cord has been considered as a bundle of sensitive and motor nerves connecting the brain with the muscles and periphery of the body; but we find that the central portion of the cord contains a considerable amount of gray matter, and that it possesses in consequence the capacity of a nervous centre. When a frog has been decapitated, sensation and volition are of course destroyed, the communication between the body and the centres in which these powers reside being cut off; but it will be found, nevertheless, that irritation of either lower or upper extremity will be followed by muscular contraction on the corresponding side; and when the irritation is excessive, contractions will occur in all the limbs. These phenomena, which are due to the action of the cord as a nervous centre, are not unfrequently observed as a consequence of disease or injury of the spinal cord. Whenever communication is cut off between any portion of the cord and the brain by disease, such as softening, or by fracture of the spine, sensibility and the power of motion are lost in the parts below the point of disease or injury; but involuntary and uncontrollable contractions occur in response to any irritation applied to the surface, such as tickling of the soles of the feet, a draft of air, or the application of the galvanic current. For the production of these reflex phenomena it is necessary: 1, that the cord be in a state of integrity; and 2, that the continuity of the spinal nerves be unbroken. If the spinal cord be broken up in the frog by the passage of a needle through the spinal canal, irritation of the extremities will produce no effect; and if the sciatic nerve, for example, be divided, the cord remaining perfect, no contraction can be produced on the side of the division. It is inferred then from direct experiments and from the evidence furnished by disease that the spinal cord is a nervous centre, which supplies innervation to the muscular and cutaneous systems through the medium of sensitive and motor filaments; the sensitive filaments conveying impressions from the surface to the centre, and the motor filaments transmitting impulses from the centre to the surface.—*Sympathetic or Ganglionic System.* This system, which is sometimes called the nervous system of organic life, consists in a double chain of nervous ganglia occupying the visceral cavities of the body, and extending along the front and sides of the vertebral column from its anterior to its posterior extremity. There are four symmetrical pairs of ganglia in the head, three pairs in the neck, ten pairs in the chest, an irregular aggregation of ganglia in the abdo-

men called the semilunar ganglion, and five pairs in the pelvis. These ganglia are all connected with each other by transverse and longitudinal commissural fibres, and they send off some filaments to join nerves from the cerebro-spinal system, and others to be distributed to all the viscera which are concerned in the maintenance of organic or purely vegetative life. The state of knowledge concerning the special properties and functions of the sympathetic system of nerves is less advanced than that which relates to the cerebro-spinal system. The reasons for this imperfect knowledge are, the difficulties of experimenting on this system from the peculiarities of its situation, and the very complex connections of the sympathetic and cerebro-spinal systems.—For further information, see Longet, *Anatomie et physiologie du système nerveux* (1842), and *Traité de physiologie* (1850-'70); Mayo "On the Nervous System" (1842); Carpenter, "Principles of Human Physiology" (1846; 7th ed., 1869); Todd's "Cyclopædia of Anatomy and Physiology;" Todd and Bowman, "Physiological Anatomy and Physiology of Man" (1850); Bernard, *Leçons sur la physiologie et la pathologie du système nerveux* (1858); Vulpian, *Leçons sur la physiologie générale et comparée du système nerveux* (1866); Dalton, "Treatise on Human Physiology" (1859; 5th ed., 1871); Flint, "Physiology of Man," vol. iv. (1872); and other systematic works on physiology.—**NERVOUS DISEASES** are properly divided into the functional and structural diseases of the nervous system. The functional diseases are those in which there is no morbid change or lesion in the nerve structures to account for the symptoms; they manifest themselves by irregular, depressed, or exalted conditions of the peculiar functions of the nervous system, viz., sensibility and motion. They may be enumerated as follows: 1. The numerous varieties of neuralgia which are independent of disease of the nerves or their centres. 2. The various forms of insanity, as delirium, monomania, dementia, and general paralysis, where no morbid change occurs in the brain to account for the symptoms. 3. The protean nervous phenomena, neuralgia, paralysis of sensation and motion, convulsions, and the various exhibitions of mental and moral perversity, constituting the disease known as hysteria. 4. Delirium tremens, that derangement of the nervous functions, manifested by optical illusions, hallucinations, mania, and muscular trembling, which arises from exhaustion of the nervous power produced by prolonged stimulation by alcohol. 5. Chorea or St. Vitus's dance, an affection occurring generally in young girls between the period of dentition and puberty, and consisting in irregular contractions of the voluntary muscles. This disease has been graphically termed "insanity of the muscles." 6. The convulsions and paralysees that occur in infancy and childhood from the irritation of teething or from gastric

and intestinal derangements. 7. Tetanus or locked-jaw, a rigid spasm of the voluntary muscles arising from an exalted state of the reflex function of the spinal cord, sometimes spontaneous, but more often the result of punctured or lacerated wounds. 8. The rare and curious derangements known as catalepsy and ecstasy. It is doubtful whether in all these cases structural disease of the nervous tissues do not really exist, and may not be discoverable by more complete examination. Accounts of these diseases will be found under appropriate heads. Structural diseases of the nervous system, or those in which the nervous symptoms arise from some morbid change or lesion in the nerve structures, may be divided into: 1, diseases of the brain and spinal cord and their coverings or membranes (see BRAIN, DISEASES OF THE); and 2, diseases of the nerves. The latter are not numerous. (See NEURALGIA.) Epilepsy, sometimes a purely functional disease of the nervous system, and sometimes organic in its origin, is described under its own head.

NESHOBA, an E. county of Mississippi, intersected by Pearl river and drained by its branches; area, 600 sq. m.; pop. in 1870, 7,439, of whom 1,703 were colored. Much of the land is uncultivated. The chief productions in 1870 were 176,189 bushels of Indian corn, 27,624 of sweet potatoes, 2,971 lbs. of tobacco, 2,492 bales of cotton, 6,471 lbs. of wool, and 5,438 gallons of sorghum molasses. There were 1,549 horses, 513 mules and asses, 2,813 milch cows, 4,773 other cattle, 4,409 sheep, and 11,774 swine. Capital, Philadelphia.

NESS, a W. central county of Kansas, watered by Walnut creek and Pawnee fork, affluents of the Arkansas; area, 900 sq. m.; pop. in 1870, 2. The surface consists of rolling prairies, and the soil is productive.

NESSELRODE, Karl Robert von, count, a Russian statesman, born on board a Russian frigate in the port of Lisbon, Dec. 14, 1780, died in St. Petersburg, March 23, 1862. He was baptized in the Protestant faith on board an English ship. He belonged to a noble German family settled in Livonia, and at the time of his birth his father was ambassador to Portugal. He began his career in the military service, but early became attaché to the various embassies of his father. Subsequently he served in that capacity with the embassies at Paris and the Hague. He gained the favor of the emperor Alexander by the brilliant style of his diplomatic compositions (which however were drawn up by his secretary), and received an appointment in the ministry of foreign affairs in St. Petersburg. As councillor of the cabinet he was frequently brought into personal contact with the emperor, who learned to appreciate his knowledge of international law and of European affairs. At the same time he knew how to disguise his superiority under an appearance of modesty, and to make the ideas which originated from his own mind appear to proceed from his

master. The favorable impression he thus produced led to his being intrusted with the ministry of foreign affairs before he was 32 years old (1812), at first under Count Razumovski; and he began from that time to control the relations of Russia with foreign countries. He formed the coalition with England and Prussia in 1813, and the negotiations and treaties with England, Sweden, Prussia, and Austria, which determined the result of the conflict with France, were almost all concluded under his influence. In the night of March 30-31, 1814, he signed the capitulation of Paris, which put an end to the wars of the first French empire (excepting the hundred days); and 42 years afterward he retired from public service after the signing of the treaty of peace in Paris, March 30, 1856, which terminated the war with Napoleon III. and his allies. At the congress of Vienna (1814-'15) Nesselrode was the first to assume for Russia that attitude of superiority which, combined with a tone of courteous and bland moderation in communicating with other nations, has since given to Russian statecraft a distinguished position in the diplomatic world. Sympathizing most with Austria, he endeavored at the same time to maintain intimate relations with Prussia, and also showed great moderation toward France, effectually opposing at the congress of Aix-la-Chapelle (1818) Great Britain's desire of prolonging the occupation of France by foreign garrisons, and exerting himself to obtain a reduction of the enormous fines imposed upon her after the battle of Waterloo. Louis XVIII. and his minister Richelieu showed their gratitude to Nesselrode and his colleague Pozzo di Borgo, and immense amounts of money passed into the hands of both. The great wealth secured by him on that and other occasions made him one of the richest men of Europe. He was one of the most extensive sheep graziers in Russia, his flocks amounting to more than 150,000, and his personal property was enormous. But the prosaic tenor of his mind was not congenial to the poetical and mystical disposition of Alexander, who regarded the holy alliance as a religious matter, while Nesselrode looked upon it merely as a political power. While preserving the first place in the foreign ministry, he was to some extent supplanted for a while in the emperor's confidence by Count Capo d'Istria, who was appointed as his colleague; but the outbreak of the Greek revolution led to his withdrawal and left Nesselrode sole master of the foreign office. The revolutionary movements which at the same period agitated Italy, Spain, and Portugal, caused Nesselrode and Metternich to adopt a stringent policy, which had reached its climax at the time of the death of Alexander I. in 1825. Nesselrode continued to enjoy the confidence of the new czar Nicholas, whose energy and commanding individuality, however, made his position less influential than it had

been under Alexander. Nesselrode's policy having always been marked by moderation and caution, the hostile attitude assumed toward Turkey soon after the accession of Nicholas was attributed rather to the emperor than to his minister; while the skill which the latter manifested in the negotiations, from those which preceded the battle of Navarino to the peace of Adrianople, contributed to strengthen the political influence of Russia. In 1844 he was promoted to the rank of chancellor of the empire. From that time his influence constantly increased. His administration, distinguished for unity of spirit and perfect mechanism, was weakened by his inflexible adherence to the policy of the holy alliance, but tempered by his desire of maintaining friendly relations with France and the other European powers. This peaceful disposition clashed with the impetuous character of Nicholas, particularly during the complications which led to the Crimean war; and although Nesselrode continued to conduct the foreign affairs during the lifetime of Nicholas and while the war was in progress, he retired soon after the accession of Alexander II. Throughout his official career he was noted for kindness toward his subordinates. Conspicuous among his personal habits was his fondness for cooking; in his daily consultations his cooks are said to have had the precedence over all others, and the invention of many dishes is attributed to him, among which is the pudding *à la Nesselrode*. His only son is now one of the "masters of the court" at St. Petersburg.

NESTOR, a legendary Grecian hero, son of Neleus and Chloris, and king of Messenian or of Triphylian Pylos. Previous to going to Troy he had taken part in wars with the Arcadians and Eleans, and in the conflict of the Lapithæ with the Centaurs; and he is also enumerated among the Calydonian hunters and the Argonauts. He went to Troy with 60 ships, at a great age, having ruled three generations of men, and during the siege figured as soldier, councillor, and orator; his superior wisdom was appealed to in all dissensions among the Grecian commanders. In the famous quarrel between Agamemnon and Achilles, he effected their reconciliation. He returned home in safety after the fall of Troy.

NESTOR, the earliest Russian chronicler, born about 1056, died about 1114. In the 17th year of his age he entered the Petcherskoi convent of Kiev, where he wrote his annals of Russia, commencing with the first appearance of the Varangians in that country about the middle of the 9th century, and bringing the history down to his own times, various events of which he described from personal observation. He wrote in the old Slavic church dialect, and both as regards the language and the contents the original work has been considerably altered by the modifications and interpolations of various continuators, so that the real merits of Nestor can hardly be ascertained.

The best edition of the text is that by Bykoff, chief librarian of the imperial library (St. Petersburg, 1873). The principal translation and critical illustration of the text are by Schlözer, *Nestors Russische Annalen*, &c. (5 vols., Göttingen, 1802-'9).

NESTORIANS, a sect of early Christians, so called after Nestorius, bishop of Constantinople in the 5th century. (See **NESTORIUS**.) They claim a still earlier origin, ascribing their conversion to the preaching of the apostle Thomas. According to a very common tradition, they are also of Jewish descent, claiming that their ancestors came from Ur of the Chaldees, and from the loins of Abraham; hence they sometimes call themselves Chaldeans. The council of Ephesus (431), which condemned and banished Nestorius, declared the true sense of the church to be that Christ consists of one divine person, yet of two natures, not mixed and confounded, although intimately united, forming what is known to theologians as the hypostatical union. But this definition did not end the controversy. John, bishop of Antioch, and several other eastern prelates, held another council at Ephesus, and issued a severe sentence against Cyril of Alexandria; and though a reconciliation was effected between John and Cyril in 433, the disciples of Nestorius continued to propagate his doctrines throughout the East. Before the close of the 6th century his followers were numerous in most countries of the East, penetrating even to India, Tartary, and China. The Nestorian church had patriarchs a part of the time at Babylon, but occupying successively the cities of Seleucia, Ctesiphon, Bagdad, and Mosul. Schools for the training of their clergy and missionaries were established at Edessa, Nisibis, Seleucia, Bagdad, and many other places. They were almost from the first divided among themselves, and at various synods adopted doctrines, such as the existence of two distinct persons in Christ as well as two distinct natures, which it is not agreed that Nestorius himself ever taught. A portion of them adhered to the Monophysite heresy. (See **CHRISTIANS OF SAINT THOMAS**.) The Nestorians were especially strong in Persia, where at one time they were the dominant sect. But in consequence of dissensions which arose in 1551, 70,000 or 80,000 of them, dwelling on the west side of the Kurdish mountains and on the plains of Mesopotamia, were led to unite with the church of Rome. Their descendants are not to be confounded with the Nestorians proper; they call themselves Chaldeans, although their exclusive right to that title is disputed. Many of them still speak Syriac, though the common speech around them is Arabic. The Jacobites, who also are numerous in Mesopotamia, were originally of the same stock, but are now quite unlike the Nestorians, and have no fellowship with them; they call themselves Syrian Christians. Some of them are subject to the Roman see. As Mohammedanism ad-

vanced eastward, the Nestorians were borne down before it; some were converted by the sword, and others killed. Still later Tamerlane destroyed a large portion of those who were not subdued by Mohammed; so that the Nestorians of to-day, about 150,000, are but a feeble remnant of a once powerful people. They dwell in the northwestern districts of Persia, spreading westward into the Kurdish mountains, a small portion residing within the borders of the Turkish empire. About 40,000 are on the plain of Oroomiah, inhabiting 300 villages, and chiefly occupied in agriculture. Their condition is seldom better than that of serfs under their Mohammedan masters. Many of the mountain districts inhabited by the Nestorians are so rugged that a beast of burden can hardly travel over them. The people subsist chiefly by the pasturage of their flocks, sometimes cultivating little terraced patches of land a few rods square. They are miserably poor, and often subject to the most cruel oppressions from their Kurdish neighbors, who inhabit the same mountains. A bloody onset was made upon them by the Kurds in 1843; nearly 10,000 Nestorians were slain, and many were sold into slavery. A little further south, in the deep, rugged valley of the Zab, a tributary of the Tigris, their condition is a little better, and they manifest more of the independent spirit of their ancestors. They have often successfully resisted the attacks of the Kurds, and they subsist more by the cultivation of the soil. Attention was particularly called to the Nestorians in 1831 by the "Researches" of Messrs. Smith and Dwight, missionaries of the American board, on a tour of observation in that region. They found them substantially maintaining their ancient faith, but sunk in ignorance and degradation. Few even of the men could read intelligently, and only one woman was found who could read at all, she being the sister of the patriarch. They had no printed books, and only a few manuscript copies of the Scriptures and other works, and these only in the ancient Syriac, which was virtually a dead language, studied only by the priests and a few others. The Bible was venerated as a relic, and the few copies existing were wrapped in cloth and laid away in the dingy churches, and brought out on great saints' days, to be kissed, but not to be read. All were enslaved by onerous fasts. Lewd dances formed their most popular social amusement, and drunkenness was so common as hardly to excite notice. The condition of woman generally was that of degradation and servitude. The birth of a daughter was regarded as a calamity. The abode of a family, often embracing several generations, consisted of a single room of the poorest description. Printing was unknown, and the spoken language had not been reduced to writing. The library of the patriarch, which was considered enormous, consisted of less than 60 volumes, including several duplicates. Many of the priests

scarcely understood the meaning of the words they used in their church service, and to the people generally they were entirely unintelligible. Theirs was virtually a dead church. And yet they still held tenaciously to the Christian name and substantially to the Christian doctrine, and their forms of worship were comparatively simple. Professing the Nicene creed with a few modifications, asserting the distinction of person and natures in Christ, refusing the title of "Mother of God" to the Virgin Mary, rejecting the doctrine of purgatory, yet praying for the dead, they acknowledged seven sacraments, though it was not always clear which they all were, burial being sometimes reckoned as one; they allowed marriage to all the clergy except bishops and the patriarch (though this restriction was violated by Bishop Mar Yohanan in 1859), and discarded auricular confession, though it is prescribed in their ancient books. They were found to be frank and manly. In stature and complexion, though somewhat darker, they differ little from Americans. American missionaries began to reside among them in 1833, and were kindly welcomed by priests and people. The first work of the missionaries, after mastering the native tongue, was to reduce the spoken language to writing, to translate the Scriptures into it, and to establish schools, some of the native clergy being among their best scholars and most efficient helpers. They also prepared school books in the vernacular, translated works of general interest into Syriac, and became teachers of the people. Their first aim was to reform the Nestorian church, not to plant any other, and for a time many of the best of the native ecclesiastics worked cordially with them. But after a while many of these drew back, and most of those who were regarded as real converts have come out from the old church and organized new societies. These are now 17 in number, with 73 congregations, simpler forms of worship, and 767 members. There are 70 schools and 1,124 pupils, and 110,000 volumes have been issued.—See "A Residence of Eight Years in Persia," by Justin Perkins (Andover, 1843), and Anderson's "Oriental Churches" (1872).

NESTORIUS, a Syrian bishop, born near the close of the 4th century, died in Libya about the year 440. He was a disciple of Theodore of Mopsuestia, became a presbyter of Antioch, and was made patriarch of Constantinople in 428. He was distinguished for his zeal against the prevailing heresies, particularly those of the Apollinarians. In his opposition to their doctrine, Nestorius maintained that there was a great distinction between Christ as the Son of God and Christ as the son of man; that the actions and sensations of the one person were to be carefully discriminated from those of the other; and that the Virgin Mary could not be called Θεοτόκος, "mother of God," but only Χριστοτόκος, "mother of Christ," because it was only the human nature of Jesus

Christ that was born of her, since God could neither be born nor die. His opinions were vigorously combated by Cyril, bishop of Alexandria, who by advice of Pope Celestine called a council at Alexandria in 430 to determine the controversy. By this assembly Nestorius was judged guilty of blasphemy and anathematized. He retorted by charging Cyril with confounding the two natures of Christ, and anathematized him in turn. Cyril, jealous of the overshadowing power of the see of Constantinople, induced the emperor Theodosius II. to call a general council at Ephesus in 431, at which Cyril presided. Nestorius was peremptorily summoned before it; but as the bishop of Antioch and others from the East who were friendly to him had not yet arrived, and the council had been improperly organized, he refused to appear and protested against their action. But he was again condemned, deprived of his bishopric, and banished from Constantinople. He was sent first to Arabia Petraea, and afterward to one of the oases of Libya. (See CYRIL OF ALEXANDRIA, and NESTORIANS.)

NETHERLANDS, or Low Countries (Dutch, *Nederlanden*; Fr. *Pays-Bas*), a country of western Europe, formerly comprising Belgium as well as the present kingdom of the Netherlands. The term is applied to this region because a large portion of the surface is a dead plain, and much of it lies below the level of the sea, from which it is protected partly by natural sand hills and partly by vast artificial dikes or embankments. The kingdom of the Netherlands as it was before 1830 was bounded N. and W. by the North sea, E. by Prussia, and S. by France, from which countries it was not separated by any great natural barriers. It is the western termination of the vast plain which stretches across Europe to the Ural mountains. Three great rivers, the Rhine, the Maas, and the Scheldt, flow through it, and their mud, mixing with the sand banks thrown up by the ocean around their mouths, has formed the country, which, excepting the S. E. portion, is nothing but the delta of those rivers. It was by nature a wide morass, which man has made fertile and habitable by laboriously protecting it by embankments from the overflow of the rivers and the frequent inundations of the sea. At present this region is divided into two kingdoms of nearly equal size, the Netherlands in the north and Belgium in the south. (See BELGIUM.)—The present kingdom of the Netherlands lies between lat. 50° 45' and 53° 35' N., and lon. 3° 24' and 7° 12' E., and is bounded N. and W. by the North sea, E. by Germany, and S. by Belgium. Its length from N. to S. is about 190 m., and its breadth from about 60 to 120 m., with an area of 12,680 sq. m. It is divided into 11 provinces, which with their respective areas, their population in 1873 (according to the annual official calculation, the last decennial census having been taken in 1869), and their capitals, are as follows:

PROVINCES.	Area, square miles.	Population in 1873.	Capitals.
North Brabant	1,980	448,045	Bois-le-Duc.
Gelderland	1,964	441,088	Arnhem.
South Holland	1,155	721,464	The Hague.
North Holland	1,054	610,990	Amsterdam.
Zealand	650	182,365	Middelburg.
Utrecht	534	179,465	Utrecht.
Friesland	1,264	307,390	Leeuwarden.
Overijssel	1,282	260,533	Zwolle.
Groningen	885	232,739	Groningen.
Drenthe	1,031	109,454	Assen.
Limburg	851	227,469	Maestricht.
Total	12,680	3,716,002	

The grand duchy of Luxemburg, though it is governed by the king of the Netherlands as grand duke, is in point of administration entirely separate. (See LUXEMBURG.) The Netherlands possess important colonies in various parts of the world, whose aggregate population far exceeds that of the mother country. The principal of these are: in the East Indies, Java, Madura, Bali, Lombok, Banca, Ternate, Amboyna, Banda, Timor, and extensive territories in Sumatra, Borneo, and Celebes, with a total population in 1872 of 24,300,000; in America, Surinam (Dutch Guiana), Curaçoa, and the islands of St. Eustatius, Aruba, Bonaire, St. Martin, and Saba, with a total population of nearly 100,000. The former possessions in W. Africa, comprising a few posts on the coast of Guinea, were by a treaty concluded in 1871, and ratified in February, 1872, ceded to Great Britain. The Hague is the residence of the king and the seat of the legislature, and Amsterdam the nominal capital of the kingdom; the other principal cities are Rotterdam, Utrecht, Leyden, Groningen, Arnhem, Middelburg, Haarlem, Maestricht, Leeuwarden, Dort, Bois-le-Duc, Nimeguen, Delft, Zwolle, and Breda.—The seacoast of the Netherlands is lined in great part by sand banks cast up by the waves of the ocean, and, where these have not been formed, by vast dikes, built partly of granite blocks brought from Norway, and partly of timbers, fagots, turf, and clay. These embankments are usually 30 ft. high, 70 ft. broad at the bottom, and wide enough at the top for a roadway. They have been constructed by the labor of many generations, at a cost estimated at not less than \$1,500,000,000, and are maintained by an annual expenditure of upward of \$2,000,000. Great pains and much expense are bestowed to keep them in order, and their supervision is intrusted to a board of commissioners, under whom there are many boards of sub-commissioners for particular districts, who from time to time report to the central board the condition of the dikes under their care. (See DIKE.) The principal rivers of the Netherlands are the Rhine, the Maas or Meuse, the Scheldt, and the Vecht, though only the lower parts of these streams are within the limits of the country. The Rhine enters from Germany on the east with a breadth of nearly half a mile,

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81°

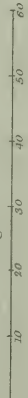
Longitude East 82° from Washington

83°

84°

THE NETHERLANDS & BELGIUM

English Miles

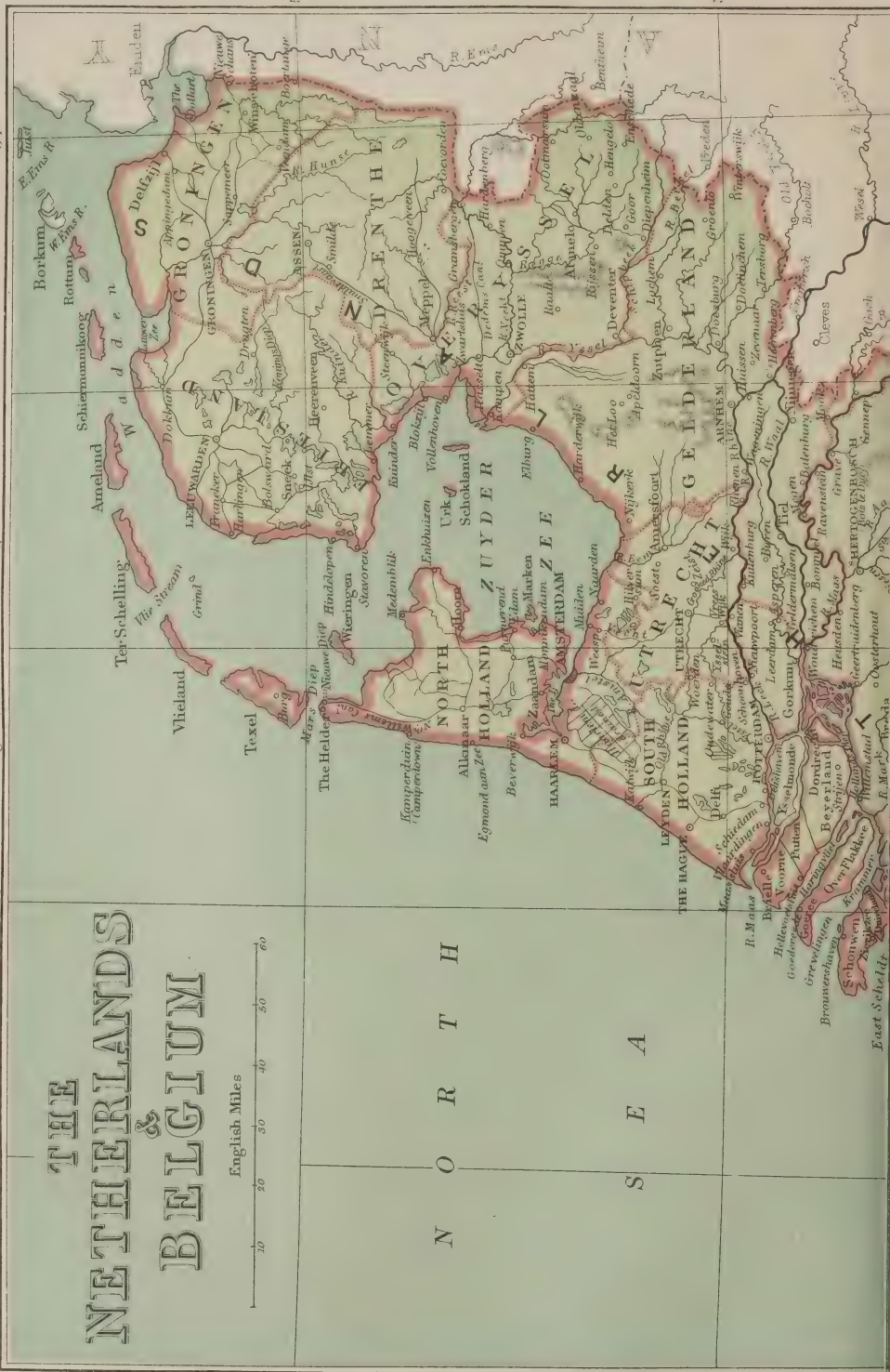


N O R T H

S E A

53°

52°





Longitude East 5° from Greenwich

and divides into two branches, of which the southern, taking the name of the Waal, runs W. for a considerable distance till it joins the Maas. The N. branch, after running N. W. a few miles, divides into two streams, of which one, called the Leek, runs W. and joins the N. branch of the Maas near Rotterdam; and the other, called the Yssel, runs N. and falls into the Zuyder Zee. The Maas enters the Netherlands from Belgium near the S. E. corner of the kingdom, and flows at first N., then N. W., and finally W., and below Gorkum divides into two branches, one of which, the Merwede, again divides, and after flowing around the island of Ysselmonde falls into the North sea; the other branch, flowing more to the south, also divides into two smaller streams and falls into the same sea. The Scheldt enters from Belgium in the southwest, and divides into two branches, one of which, called the Eastern Scheldt, flows N. between Zealand and North Brabant, and then W. by many channels, enclosing numerous islands, to the sea; the other branch, the Western Scheldt, flows W. in a broad estuary to the sea. The Vecht enters from Germany on the northeast, and falls into the Zuyder Zee at no great distance from the mouth of the Yssel. All these rivers are kept within prescribed channels by embankments, and are connected by canals, which serve not only for navigation but to prevent inundations by draining off the superfluous waters. The Netherlands originally abounded in lakes, about 90 of which have been artificially drained and converted into cultivable land, while others by inundations have been changed into gulfs of the sea. Among the latter is supposed to be that great inlet of the North sea, the Zuyder Zee, which covers about 1,200 sq. m. in the N. part of the kingdom, and is thought to have been originally a large fresh-water lake. The lake of Haarlem, before it was drained, covered 70 sq. m. (See DRAINAGE, and HAARLEM MEER.) The Dollart, a lake between Groningen and the Prussian province of Hanover, was formed by irruptions of the sea in 1277 and 1287, and occupies about 60 sq. m.—The surface of the country is almost everywhere a dead level, and such natural elevations as exist are little more than small sandy hillocks. But the monotony of the surface is relieved by the numerous canals crossed by frequent bridges, and lined with willows and other trees, with which also the roads are bordered; by large and handsome towns at short intervals; and by countless villas and farm houses, all of which are kept in a state of the utmost order and neatness. The country is everywhere well peopled, and no population in the world exhibits a more uniform appearance of wealth, comfort, and contentment. The soil in some places, especially in the waste lands of Gelderland and Drenthe, is naturally poor, but by cultivation has been rendered as rich and productive as the other parts. Wheat, rye, barley, oats,

peas, beans, buckwheat, madder, rape seed, hops, tobacco, clover seed, mustard seed, flax, and hemp are extensively raised. Dutch horticulture has long been famous, and among the flowers tulips and hyacinths are especially cultivated. Pulse and garden vegetables are everywhere raised in great abundance. Very large orchards of apple, pear, and cherry trees are found, especially in Gelderland. Of the entire area about three fourths is productive land, and more than one half of this consists of meadows and pasture. The woodland comprises only about 9 per cent. of the productive soil. In South Holland the pasture land is twice as extensive as the arable, while in Friesland the proportion is more than 8 to 1, and the rearing of live stock and dairy husbandry are more productive and profitable than tillage. In 1870 the country had 252,054 horses, 1,410,822 cattle, 900,187 sheep, and 329,058 hogs. Upon the excellent meadows created by draining bogs and lakes vast herds of cattle, some of which are brought from Denmark and Germany in a lean state, are fattened for market. Immense quantities of butter and cheese of the best quality are produced and exported at high prices. Another important product of the soil is peat, which is largely used for fuel.—The climate is variable, and subject to great extremes of heat and cold. The temperature has sometimes fallen to 23° below zero, and risen to 102°. In winter the rivers and canals are sometimes frozen for three months. The country is subject to violent gales; the atmosphere is generally damp, dense fogs prevail, and agues, pleurisies, and rheumatisms are frequent. Consumption is not uncommon. The pleasantest months are August and September. From the nature of the soil, which is almost everywhere alluvial clay and sand, there are necessarily no mines, though a little bog iron has been found. The eastern provinces, especially Gelderland and Overijssel, have some forests of oak, elm, and beech, but in general the country is destitute of trees except those which have been planted by man. Plantations, however, are very numerous, and serve greatly to embellish the vicinity of the towns and villages; and the level scenery is also diversified by groups of wind mills, mostly employed in draining the low grounds. There are no large wild animals and few game birds, though partridges, hares, and rabbits are plentiful. Storks are very numerous, and remain from the middle of February till the middle of August. They are favorites with the people, and severe penalties are imposed on those who destroy them. Water fowl are extremely abundant, and the waters of the coast are frequented by vast shoals of cod, turbot, and other fish.—The population of the Netherlands is composed mainly of Dutch, with about 250,000 Walloons, Frisians, and Germans, and about 68,000 Jews. The Dutch belong to the great Germanic family of mankind. The men are generally of middle stature,

stout form, and fair complexion. The women are tall and handsome, are very domestic in their habits, and pay the most scrupulous attention to the cleanliness of their houses. Sobriety, steadiness, economy, perseverance, and industry are the most striking features of the national character. Even the youth of both sexes are as sedate and cautious as the older people of other nations. Smoking is very common. Brandy, gin, and beer are favorite beverages, but intoxication is said to be very rare. There is great wealth in the Netherlands, and it is widely diffused, but there is little ostentatious display of it. The people generally live well, but frugally. The houses in the towns are plainly built and furnished. The country abounds in villas called pleasure houses (*lust-huizen*), which are usually built of brick, plastered and painted.—There are more than 600 ship yards in the country. Among the chief branches of industry are the iron and brick manufactories, the oil mills, and the tobacco manufactories. The fabrication of earthenware at Delft is extensive and celebrated. This country has long been noted for its distilleries of spirits, and especially of gin, for which Schiedam is peculiarly famous. The manufacture of paper is extensive, and there are in the provinces of Friesland, Groningen, Gelderland, and North Brabant many establishments for the manufacture of shoes for exportation. The Dutch linens are of superior quality, and the manufacture of linen and cotton goods is carried on extensively in most of the provinces. The cotton manufacture in 1873 employed about 230,000 spindles. At Tilburg there are woollen manufactories employing several thousand persons, and there are extensive silk manufactories at Amsterdam, Haarlem, and Breda. The fisheries of Holland have long been famous for their extent and productivity, especially the herring fishery, which has been carried on since the 12th century, and has been termed the Dutch gold mine. It is a common saying among the people that "the foundations of Amsterdam are laid on herring bones." In the middle of the 18th century the number of men employed in the herring, cod, and whale fisheries was computed at 100,000. In the first half of the 19th century the fisheries greatly declined, and in 1854 the number of vessels of all kinds employed was 1,375, of men 7,753, and the value of the produce about \$15,000,000. Since then it has again improved, and the total number of families supported by the fisheries was in 1872 estimated at 20,000.—The commerce of the Netherlands, though not as extensive as formerly, is still great and active. In 1871 the imports were valued at 586,800,000 florins, and the exports at 460,500,000. Commerce is carried on chiefly with Great Britain, Germany, Java, Belgium, France, and Russia. The exports to the United States from the Netherlands and the Dutch colonies during the year ending June 30, 1873, were valued at \$11,700,-

000, and the imports at \$12,500,000. The mercantile marine in December, 1874, comprised 1,804 vessels, with an aggregate tonnage of 495,285. In 1873 the entrances of shipping into the Dutch ports amounted to 8,762 vessels of 2,968,404 tons, and the clearances to 8,765 vessels of 3,029,646 tons.—The internal intercourse and commerce of the country are chiefly carried on by means of the canals, which communicate with the Rhine and other large rivers, and afford an easy and cheap conveyance for merchandise and passengers. The usual mode of travelling on the canals was formerly, and in a very few districts is still, by *trekschuits* or draught boats, which are dragged by horses at the rate of 4 m. an hour; but small steamboats are now commonly used. The principal canal, the North Holland, runs N. from Amsterdam to the harbor of Nieuwediep on the Helder point, where it joins the sea and thus affords Amsterdam an easy intercourse with the ocean. (See CANAL, vol. iii., p. 688.)—A large part of the foreign commerce of the Netherlands is conducted by the *Handel Maatschapij*, or trading association, which in 1824 took the place of the Dutch East India company, which had for two centuries monopolized the trade with the East. (See EAST INDIA COMPANIES.) The *Handel Maatschapij* is the agent for the sale of the government colonial produce in Europe, of which it is also the carrier, and farms some branches of the public revenue of the East India colonies. Two thirds of the exports of the colonies pass through its hands, though it has no exclusive trading privileges. Another great association is the "Society for the Promotion of the Public Good" (*Maatschapij tot nut van 't algemeen*), which was organized in 1784 by a few benevolent persons, and has spread till it has upward of 200 branches throughout the country, with many thousand members, each of whom contributes to its funds a small sum annually. Its object is to promote the establishment of schools, hospitals, asylums, and other works of public utility. Its sections hold meetings once a fortnight, at which questions and measures tending to advance the common welfare are discussed, politics and ecclesiastical matters being excluded. Institutions for the relief of the destitute and suffering are abundant, though in general the poor are taken care of by the churches to which they belong. The number of savings banks in 1870 was 206, of which 162 belonged to the society of public good; 169 savings banks, from which official reports had been received, had 91,565 depositors, whose aggregate credits amounted to 11,933,086 florins. There are three great almshouses, one each at Amsterdam, Middelburg, and Groningen, which afford shelter, food, and clothing to a large number of persons. Pauper colonies have also been formed on the waste lands of the country, and the able-bodied men employed in reclaiming them. The expense of these colonies is about \$1,000,000 per annum,

and the total annual revenues of the charitable institutions of the kingdom exceed \$5,000,000. The total number of persons receiving aid from the state in 1869 was 213,620. Education is provided for by a non-sectarian primary instruction law, passed in 1857. It is under the care of the department of the interior, and is compulsory. In January, 1871, there were 2,608 public and 1,119 private schools, the former numbering 390,129 and the latter 111,762 pupils. The teachers are superintended by 94 district school inspectors, who are under 11 provincial superintendents. The proportion of the pupils of the primary schools to the entire population is 1 in 8. Higher education is imparted by 81 schools of middle instruction, with 7,047 pupils, and 55 Latin schools and gymnasia, with 1,128 pupils. There are three universities, at Leyden, Groningen, and Utrecht, with 1,339 students in January, 1871; two collegiate institutions called *Athenæums*, at Amsterdam and Deventer; and a polytechnic institution at Delft.—By the constitution of the Netherlands full religious liberty is guaranteed to the people, and all churches are equal before the law. On Dec. 1, 1869, the population was thus divided: Dutch Reformed, 1,956,852; Walloon Reformed, 5,371; Remonstrants, 5,486; Christian Reformed, 107,123; Mennonites, 44,227; Evangelical Lutheran, 57,545; Reformed Lutheran, 10,522; Moravians, 371; Anglican Episcopal, 456; church of Scotland, 84; English Presbyterians, 417; Roman Catholics, 1,307,765; Old Catholics (*Jansenists*), 5,287; Greek church, 32; Dutch Israelites, 64,478; Portuguese Israelites, 3,525; unknown, 5,161. The government partly pays the salaries of the ministers, priests, and rabbis of recognized congregations. The Reformed church holds to the "Confession of Faith" drawn up in the 16th century according to the doctrines of Zwingli and Calvin. It has a presbyterian form of government, and is ruled by a consistory in each congregation, by classes composed of the ministers of several contiguous parishes, together with one elder from each, by provincial synods, and by a general synod which meets annually at the Hague. The number of ministers in the church in 1873 was 1,596. There is a Roman Catholic archbishop at Utrecht, and bishops at Haarlem, Bois-le-Duc, Breda, and Roermond. The majority of the Roman Catholics are in North Brabant and Limburg. The church in October, 1873, had 973 congregations and 2,023 priests. The Old Catholics have an archbishop of Utrecht, and bishops of Haarlem and Deventer.—The government of the kingdom of the Netherlands is a constitutional monarchy, of which the crown is hereditary in the house of Orange-Nassau. All the inhabitants without distinction are entitled to protection for person and property, and all natives are eligible to offices and public employment. Freedom of the press and the right of the people to assemble and to petition are inviolable. The eldest

son of the king bears the title of prince of Orange. The king possesses the executive power, declares war, concludes peace, and makes treaties, commands the army and navy, fixes the salaries of all officers, and confers titles of nobility. He proposes projects of law to the legislature, whose chambers he can dissolve at pleasure, though he must command new elections in the course of 40 days after the dissolution, and must convene the new chambers within two months. He has a council of state, consisting in 1873 of 15 members besides the princes of the royal house, which may be consulted on extraordinary occasions. In 1874 there were seven heads of departments in the ministerial council, viz., the ministers of the interior, of finance, of justice, of the colonies, of foreign affairs, of marine, and of war. The king, the ministers, a secretary, and two royal princes constitute at present the members of the cabinet council. The legislative power is intrusted to the states general, composed of two chambers. The members of the upper house (called *eerste kamer*, first chamber), 39 in number, are elected by the provincial states for a term of nine years, a third of their number retiring every three years. Their president is appointed by the king once a year. The members are selected from the class who pay the highest amount of direct taxes, the number of persons eligible in 1871 being 1,098. The following is the ratio of their distribution among the provinces: Drenthe, 1; Groningen, 2; Utrecht, 2; Zealand, 2; Friesland, 3; Limburg, 3; Overijssel, 3; Gelderland, 5; North Brabant, 5; North Holland, 6; South Holland, 7. The lower house (*tweede kamer*, second chamber) in 1872 had 80 members, who are chosen for four years, from 41 electoral districts, to which they are assigned in the ratio of one representative to 45,000 inhabitants, Amsterdam having 6 representatives. They are chosen at biennial elections by electors who must be 23 years of age, and pay taxes varying in different districts from about \$8 per annum to about \$24. Each member is paid a salary of about \$800 a year and his travelling expenses. The speaker of the house is appointed by the king. The king's ministers have a right to sit and speak in either house, but not to vote. The states general meet at the Hague every year on the third Monday in September, and hold their sessions in public. They are obliged by law to sit at least 20 days. A majority is required for a quorum; and no measure can be enacted without the assent of an absolute majority of each house. In each province there are provincial "states," which are legislative and administrative bodies. Besides electing the members of the upper house of the states general, they are charged with the execution of the laws of the kingdom within their limits, and have power to make special and local laws, which, however, are subject to the sanction or veto of the king. The internal police of the

provinces is left to their superintendence. The king appoints a commissioner to preside over their sessions, which are held semi-annually. The members are elected for six years at triennial elections, by the same constituencies that elect the members of the states general. The number of the members of these provincial legislatures varies in each province, that of South Holland, which is most numerous, having 80 members, and that of Drenthe, the smallest, 35. The communes into which each province is subdivided are governed by a burgo-master appointed by the king and by local councils elected by the people for a term of years. In 1874 the public debt amounted to 987,020,076 florins. The receipts were 93,742,143 florins, and the expenditures 100,243,980. The receipts of the colonial administration in 1874 were 124,908,632 florins, and the expenditures 114,761,528. In the budget for 1875, presented Sept. 19, 1874, the receipts were estimated at 129,000,000 florins, and the expenditures at 119,000,000. The army in 1874 comprised 62,071 men. The navy consisted of 84 steamers and 16 sailing vessels, carrying together 773 guns, besides which there were about 70 gunboats. The fleet was manned on July 1, 1874, by 6,886 men, including 1,864 marines. The largest moneyed institutions are the Netherlandish bank in Amsterdam, founded in 1814, which is a bank of issue and has a capital of 16,000,000 florins; the bank of Amsterdam, established in 1872, capital 10,000,000; and the bank of Rotterdam, capital 15,000,000. The aggregate length of the railroads in operation Jan. 1, 1874, was 989 m., the larger portion of which were owned by the state, besides 549 m. for which concessions have been given. The electric telegraph lines owned by the state had an aggregate length of 3,277 m.; the length of the wires was 11,738 m. The extent of the net of private telegraphs is not known.—Justice is administered by various courts, the chief of which is the high court of the Netherlands, consisting of a president, vice president, and 12 judges, appointed by the king from three candidates presented to him for each vacancy by the lower house of the states general. The judges hold office for life. This court hears appeals from the lower courts. All causes in which the state is defendant are tried before this court, and the high functionaries of government are amenable to it only. There is also a provincial court in each province, and subordinate to them are district courts, which have each from 5 to 14 judges, and 150 cantonal courts, which have each a judge of the peace and a recorder. In 1870 the prisons of all kinds had 2,407 inmates. There is an excellent prison for male juvenile delinquents at Rotterdam, and another for young females at Amsterdam, which are admirably managed and serve as schools for intellectual and religious training.—The first historical notice of the Netherlands (in the wider sense) which has

come down to us is contained in Cæsar's account of his wars with the Belgæ and other barbarian tribes who inhabited its morasses. These tribes were mostly of Gallic race, though in some parts of the country several clans of Germanic origin had established themselves, preëminent among whom were the Batavi, whom Tacitus calls the bravest of all the Germans, and of whom in fact the Romans always spoke with marked respect. They were the allies, not the subjects of the Romans, and a Batavian legion formed the body guard of the emperors down to the time of Vespasian. During the civil war between Vespasian and Vitellius, Claudius Civilis, a Batavian who had served for many years in the Roman army and had received a Roman education, organized a general confederation of all the Netherland tribes against the Romans (A. D. 69); but after a heroic struggle the insurgents were crushed by the armies of Vespasian, who had now attained the purple, and the Netherlands remained among the provinces of the empire till they were overrun by the northern barbarians in the 5th century. The Batavi still formed the bravest portion of the Roman forces, and their cavalry was particularly distinguished. In the great battle at Strasburg between the Germans and the army of the future emperor Julian (357), the Batavian horse saved the day for the Romans. This was the last of their achievements mentioned in history, and soon afterward the Batavian nation seems to have lost its individuality and to have become merged, together with the Belgæ, in the Frankish and Frisian tribes who had invaded and occupied the country. The monarchy of the Franks in the 6th and 7th centuries embraced the whole of the Netherlands. In the 8th century the Frisians revolted, but were subdued by Charles Martel about 734, and were soon afterward converted to Christianity. At the beginning of the 9th century they formed a part of the empire of Charlemagne. A century later, under the influence of the feudal system, the whole of the Netherlands was in the possession of a number of princes, owning a limited species of allegiance, some to the German empire, and some to the kings of France. In 922 Charles the Simple created by letters patent the first count of Holland. Before the 13th century the Netherlands had become divided into several dukedoms and countships, whose chiefs acknowledged little more than a nominal allegiance to any other sovereign. The most powerful of these potentates was the count of Flanders, whose dominions in 1384 fell to the house of Burgundy; and in 1437 Philip the Good, duke of Burgundy, became master of almost the entire Netherlands, and his successors acquired the rest. At this period the country had already become rich and populous, and the commercial cities had acquired a controlling influence in the government, and within their own limits enjoyed almost republican freedom. The states general, as the parliament

was called, granted money to the sovereign only when they saw fit. Under the house of Burgundy the Netherlands became the most opulent and populous part of Europe; and their chief cities, Antwerp, Ghent, and Bruges, were especially distinguished for their wealth and splendor. By the marriage of Mary of Burgundy, daughter of Charles the Bold, with Maximilian, archduke of Austria (1477), the Netherlands became a possession of the house of Hapsburg. Her grandson, the emperor Charles V., resigned them to his son Philip II. of Spain in 1555. At this period the Netherlands comprised the dukedoms of Brabant, Limburg, Luxembourg, and Gelderland; the countships of Artois, Hainaut, Flanders, Namur, Zutphen, Holland, and Zealand; the baronies of Friesland, Mechlin, Utrecht, Overijssel, and Groningen; and the margraviate of Antwerp; in all, 17 provinces. They contained 208 walled cities, 150 chartered towns, 6,300 small towns and villages, and 60 fortresses of great strength, besides hamlets, castles, and farm houses. The reformation had made considerable progress among the people during the reign of Charles V., chiefly in the cities, and Philip II. soon after his accession undertook to root out entirely the new doctrines. After his father's abdication Philip remained in the country till August, 1559, when he departed to his Spanish dominions never to return. He left the Netherlands under the government of his sister Margaret, duchess of Parma, as regent, assisted by three councils: a council of state, a privy council, and a council of finance. Of these the council of state was the most important. It consisted at first of five members, among whom were two native nobles of the highest rank and character, the prince of Orange and Count Egmont. Three more were afterward added, the most distinguished of whom was Count Horn. But all the real power of the council was exercised by a secret committee of three, called the *consulta*, and this was entirely under the control of one of its members, Antoine Perrenot, bishop of Arras, afterward Cardinal Granvelle, a native of France, who was greatly detested by the people. The arrogance of Granvelle and the attempt to introduce the inquisition provoked a determined resistance, which was headed by the prince of Orange, Egmont and Horn, and other great nobles. An insurrection of the Protestants broke out in Flanders, Aug. 14, 1566, spread rapidly into other provinces, and lasted about a fortnight, during which great ravages were committed on the churches and monasteries. (See *ICONOCLASTS*.) This outbreak, which was temporarily suppressed by the influence of William of Orange, Egmont, and Horn, and by concessions from the frightened duchess of Parma, determined Philip to resort to the most severe measures to suppress Protestantism; and accordingly the duke of Alva was sent to the Netherlands in 1567, with a powerful army of Span-

ish veterans. Egmont and Horn were arrested and beheaded at Brussels (June 5, 1568), and also many other noblemen of distinction, and for six years the country suffered under a tyranny which for extent and ferocity is almost unparalleled in history. The prince of Orange withdrew to Germany, and appealed to the Protestant princes of that country for aid. They allowed him to raise a force of volunteers, and gave him some pecuniary assistance, as did also Queen Elizabeth of England. He reentered the Netherlands in the latter part of 1568 at the head of an army, and called his countrymen to arms. A long war ensued, distinguished by sieges rather than by battles, and marked by various fortune on both sides. The states of Holland and Zealand conferred almost dictatorial powers on the prince of Orange, with the title of stadtholder; and those provinces equipped a powerful naval force which greatly contributed to the ultimate achievement of Dutch independence. The severity of Alva having driven the greater part of the Netherlands to insurrection, and his attempts to suppress the revolution by force of arms having entirely failed, he was recalled, and departed in December, 1573. His successor, Requesens, was instructed to adopt a milder system of government; but he met with little success, and died of fever in March, 1576. Philip's brother Don John of Austria, the victor of Lepanto, succeeded him as viceroy; but after gaining several victories over the revolutionary forces, he too died of fever (some supposed of poison), Oct. 1, 1578. He was succeeded as regent by his nephew Alessandro Farnese. In the following year (the so-called pacification of Ghent of 1576, for the same purpose, having failed) the provinces of Holland, Zealand, Utrecht, Friesland, Groningen, Overijssel, and Gelderland formed the union of Utrecht, and thus laid the foundation of the republic of the Seven United Provinces. Zutphen and North Brabant subsequently joined the confederation. From this period the history of the Netherlands divides itself into that of Holland and that of Flanders and Brabant, or the southern provinces which remained under the Spanish dominion and adhered to the Roman Catholic faith, and now, though diminished by cessions of territory, constitute the kingdom of Belgium. (See *BELGIUM*.) The assassination of William of Orange, July 10, 1584, was a terrible loss to the struggling commonwealth, which owed its existence mainly to his extraordinary wisdom, prudence, and firmness. The Dutch patriots, however, did not despair. They continued the contest with unabated courage and energy, and finally with a success truly astonishing when we consider the resources of Spain, at that time the first power in the world. Prince Maurice of Nassau, a son of the murdered statesman, though not yet 17 years of age, was chosen to succeed him. He proved to be one of the greatest generals of modern

times, and his career till his death in 1625 was an almost unbroken series of battles, sieges, and victories. About this time the sovereignty of Holland was offered to Elizabeth of England, who declined it, but sent the earl of Leicester to the assistance of the Dutch with a body of troops. Leicester, however, effected little, and was recalled in 1587. Philip II. died in 1598, and his successor Philip III. for some years continued the effort to subdue the revolted provinces. But the Dutch by this time had created a fleet that made them the first naval power of the world. Their ships were manned by hardy and daring seamen, who swept the most distant seas of Spanish commerce, and finally so impoverished the king of Spain by intercepting the remittances of treasure from the colonies, that in 1609 he agreed to a truce for twelve years. During the peace internal dissensions broke out in Holland between the Calvinists and Arminians, whose theological differences were made the basis of political parties, who contended for their respective tenets with great zeal and bitterness. These dissensions were fomented by Maurice, who aspired to become hereditary sovereign, and was already by his influence over the army exercising a species of dictatorship. He was opposed by the venerable Barneveldt, the head of the Arminian party, or as they came to be called the Remonstrants, from a remonstrance which they published in favor of universal toleration. The Calvinist party, of which Maurice was chief, were soon known as Anti-Remonstrants, and those names have continued to be used in Holland to the present day. The Calvinists prevailed in the contest for the political supremacy, and Barneveldt and the famous Grotius, another eminent leader of the Remonstrants, were arrested on charges of treason. After an infamous trial, in which party spite and popular clamor were brought to bear on the judges, Barneveldt was condemned and executed, May 13, 1619, at the age of 71 years. Grotius by an artifice escaped from prison, and took refuge in France. On the expiration of the truce in 1621, the war with Spain was renewed. After the death of Maurice, who was succeeded by his brother Frederick Henry, operations on land were not for some time prosecuted with much vigor, but on sea the Dutch displayed great energy. They attacked Peru with success, and conquered San Salvador and a large portion of Brazil, which at that period belonged to the Spanish monarchy. They also made incessant attacks on the Spanish possessions in the East Indies, and laid the foundations of the Dutch empire in that part of the world. On the general pacification of Europe by the peace of Westphalia in 1648, a final treaty was made with Spain, which acknowledged the independence of the United Provinces after it had been practically maintained for 70 years. This treaty also aggrandized the republic with North Brabant and a portion of Limburg.

Frederick Henry had in the mean while been succeeded by William II. A few years later the republic became involved in war with the English commonwealth, and several great naval battles were fought between the celebrated Dutch commanders Van Tromp, De Ruyter, and De Witt, and the famous English admiral Blake. After his victory near the Goodwin sands, Nov. 29, 1652, Van Tromp sailed along the English coast with a broom at his masthead to indicate his sweeping the channel of English ships. In the final engagement, at the close of July, 1653, Van Tromp was killed and the Dutch were defeated with great loss. Peace was soon after concluded between the two republics, and Holland immediately engaged in a war with Portugal concerning their respective possessions in Brazil, in which many Portuguese vessels were captured. The war ended by the expulsion of the Dutch from Brazil in 1654. In 1665 Charles II. of England declared war against Holland, and hostilities on the ocean were prosecuted with much vigor. Several desperate naval battles were fought with varying success during the years 1665-'6, the advantage on the whole being with the English. In June, 1667, however, De Ruyter sailed up the Thames with his fleet, burnt the shipping at Sheerness and Chatham, and blockaded for a short period the port of London. A month later the peace of Breda ended the war, and in the beginning of 1668 Holland entered into an alliance with England and Sweden to check the growing power of Louis XIV. of France, who had seized upon the Spanish Netherlands. But the fickle and deceitful Charles II., being bribed by Louis, ordered a treacherous attack on a rich Dutch fleet from Smyrna in March, 1672, which was bravely repulsed. On the 17th of the same month he declared war against his late allies, and sent a force to coöperate with the French. Sweden also joined the league against the Dutch, and Louis invaded Holland at the head of 100,000 men commanded by the first generals of the age, and in a few days conquered the provinces of Utrecht, Gelderland, and Overijssel. The Dutch, whose forces did not exceed 25,000 men, were besides divided and weakened by the most violent contests between the partisans of the house of Orange and the opponents of that party, headed by the grand pensionary John De Witt and his brother Cornelius, by whose influence the office of stadtholder had been abolished in 1650 and the states general made the supreme power. The partisans of De Witt proposed to remove the whole nation to the East Indies rather than submit; but the young prince of Orange, William III., afterward king of England, encouraged the people to resist, and declared he would die in the last ditch. He was made stadtholder by acclamation, was intrusted with dictatorial power, and the De Witts were massacred by a mob at the Hague. The desperate resolution was taken to cut open the dikes and let in the ocean to

drown the country and its invaders. This expedient was successful, and the baffled French were forced to retreat with great loss. Peace with England was concluded in 1674, and with France by the treaty of Nimeguen in 1678. The prince of Orange, who continued to hold supreme and almost absolute power in Holland, was married to the princess Mary, daughter of James II. of England, in 1677, and attained the throne of England by the revolution of 1688. During his life, and for several years after his death in 1702, Holland bore a conspicuous part in the wars waged by the European powers against France to check the ambitious designs of Louis XIV. On the death of William III. the anti-Orange party prevailed in Holland, and no stadtholder was appointed. The republic was governed by the states general, the grand pensionary, as the chief executive was styled, being till his death in 1720 the eminent statesman and diplomatist Heinsius. In 1747, the Orange party having regained the ascendancy, William IV. was made stadtholder of the republic; and on his death in 1751 his infant son William V. succeeded to the office, which he held till 1795, when Holland was conquered by France, and the Batavian republic established. During the seven years' war, from 1756 to 1763, Holland remained neutral; but in the progress of the American revolution she became involved in war with England, and her fleet sustained a severe defeat from the English on the Dogger bank in 1781, after a bloody fight. The French revolution found warm partisans in Holland among the anti-Orange faction, and their sympathy and assistance, together with an intense frost which enabled the French army to pass the rivers and canals on the ice in the winter of 1794-'5, rendered the conquest of Holland by Gen. Pichegru an easy task. The Batavian republic, which in its closing years was administered by the director Schimmelpenninck, a statesman and patriot of eminent ability and integrity, terminated in 1806 by the erection of Holland into a kingdom, on the throne of which the emperor Napoleon placed his brother Louis. Louis ruled with moderation and kindness, but his preference of the interests of Holland to those of France gave such offence to his imperial brother, that in 1810 he abdicated, and Holland was incorporated as an integral part of the French empire. On the downfall of Napoleon the prince of Orange, who had been in exile in England, was declared king by an assembly of notables, under the title of William I., with a constitution limiting his power within moderate bounds. The ancient southern provinces, which had remained under Spanish rule at the time of the great revolution of the 16th century, and had subsequently belonged to the house of Austria, were annexed to Holland by the congress of Vienna, with the object of forming a power of sufficient force to serve as a check to the progress of France toward the northeast. The difference

of race, religion, language, and manners, however, prevented the assimilation of the two sections into one nation; and on the outbreak of the French revolution of 1830 the southern provinces revolted, and, aided by the French, established their independence as the kingdom of Belgium, with Leopold of Saxe-Coburg as king. The final settlement between the two kingdoms took place in 1839, when that part of Luxemburg which had been constituted by the congress of Vienna a grand duchy under the king of the Netherlands, was enlarged by a portion of Belgian Limburg. Since the separation the kingdom of the Netherlands has continued flourishing and peaceful, and has made rapid advances in prosperity and opulence. In 1848, after the French revolution of that year, the constitution was still further liberalized, and extensive reforms were introduced. William I. abdicated in 1840 in favor of his son William II., who died in 1849, and was succeeded by William III., the present king. In August, 1862, the states general passed a law for the abolition of slavery in the Dutch West Indies, which went into operation July 1, 1863. During the war between France and Germany the Netherlands maintained a strict neutrality. With the exception of occasional conflicts with the natives in some of their East India colonies, the most important of which was a war with Acheen in the island of Sumatra in 1873-'5, the Netherlands have been engaged in no war with a foreign power since the conclusion of the treaty with Belgium in 1839. The contests between the liberal and conservative parties in regard to questions of internal policy have for several years been very bitter, but, with unimportant exceptions, have been carried on in conformity with the constitution and laws.—See Schiller, *Geschichte des Abfalls der vereinigten Niederlande von der spanischen Regierung*; Bilderdijk, *Geschiedenis des vaderlands* (12 vols., 1832-'9); Leo, *Zwölf Bücher niederländischer Geschichte* (2 vols., 1832-'5); and Motley, "The Rise of the Dutch Republic" (3 vols., 1856), "The History of the United Netherlands," &c. (4 vols., 1860-'67), and "The Life and Death of John of Barneveld" (2 vols., 1874).

NETHERLANDS, Language and Literature of the.

Under the title GERMANIC RACES AND LANGUAGES, the development of the Dutch language, and the relation which it holds to the other languages of the Teutonic group, have been discussed. The Dutch alphabet consists of 23 letters, counting *ch*. It does not include *c*, *q*, *x*, or *y*, which occur only in words derived from other languages. *H* is always an aspirate, and is never written, as in German, merely to lengthen a vowel. *G* and *ch* are nearly alike, resembling in sound the *ch* in the Scotch *loch*; *g* is not quite so guttural. When *l* is preceded by a vowel and followed by a consonant, a slight short *e* is sounded between it and the consonant. *Sch* is not pronounced together as in German, but the *s* and

the *ch* are distinct, as in *schip* (pronounced nearly *skhip*), ship; and when at the end or in the middle of a word it sounds almost like a simple *s*. *V* has always the flat sound of *f*. The other consonants are sounded as in English. The vowels are generally sounded as in German, but are distinguished as long when ending a syllable, and as broad when followed by a consonant in the same syllable. Thus *a* in *man*, man, sounds as in *fat*; in *laten*, to let, as in *psalm*; and *aa* is always long: *e* in *bel*, bell, as in *met*; in *geven*, to give, like *a* in *mate*, and *ee* the same; but *e* at the end of words of more than one syllable is very short, or nearly mute: *i* as in *him*, or if long as *ie* in *grief*: *o* as in German *von*, or if long as in *hope*, and *oo* the same: *u* as in *but*, but if long, at the end of a syllable, like the French *u* or the German *ü*, and *uu* the same. Of diphthongs and other compound vowel sounds, *au* is pronounced like *ou* in *house*; *ei* like *i* in *mine*; *eu* like the German *ö* in *Vögel*, or the French *eu* in *feu*; *ie* as in *grief*; *oe* like *oo* in *boon*; *ou* as in *out*, except that the *u* sound is more distinguishable; *ui* nearly like *oy* in *joy*: of *aai*, the *aa* is long, and the *i* scarcely sounded; of *eeuw*, the *ee* is long (Eng. *ā*), and *uw* follows it like the English *uw*; of *ooi*, *oo* is long as in *hope*, and followed by a short *i* sound; of *ieuw*, *uw* is sounded like *üw* in German, and the *ie* is almost mute; *oei* sounds almost like the French *oui*. *Ai*, sounded like *i* in *mine*, is now out of use, and *ei* is written instead; thus, *keizer* for *kaizer*. The double vowel *ij* must be spoken a little broader than *ei*. This compound has been substituted in recent times for *y*, which is still used in foreign words and generally in writing. A *trema* or diæresis is used to denote that succeeding vowels must be pronounced separately; the circumflex accent indicates that the letter *d* has been omitted, as *Neerland* for *Nederland*; the acute accent, that a vowel has to be emphasized; and the apostrophe is used instead of letters and syllables left out, as *'s* for *des*, of the, and *'rtoe* for *daartoe*, thereto.—Three genders are distinguished, masculine, feminine, and neuter; and four cases, nominative, genitive, dative, and accusative. The definite article is declined as follows: masc. sing. nom. *de*, gen. *des* or *van den*, dat. *den* or *aan den*, acc. *den*; fem. sing. nom. *de*, gen. *der* or *van de*, dat. *der* or *aan de*, acc. *de*; neuter sing. nom. *het*, gen. *des* or *van het*, dat. *den* or *aan het*, acc. *het*; plural for all three genders, nom. *de*, gen. *der* or *van de*, dat. *den* or *aan de* (sometimes *der* in the feminine), acc. *de*. The indefinite article *een* receives when inflected terminations corresponding to those of the definite article singular. The plural in nouns is generally formed by adding *en* to the singular, as *meening*, opinion, *meeningen*, opinions; but nouns ending in *el*, *er*, *aar*, and *ier* take *en* or *s*; those in *em*, *en*, and diminutives in *je*, take *s*; those in *heid* change into *heden*; those in *man* change into *lieden* (*koopman*, pl. *kooplieden*, as in Ger. *Kaufmann*, pl. *Kaufleute*); those in *e* take

only *n*; and those with a broad vowel double the final consonant before taking *en*. In the various cases, nouns remain invariable except the masculine and neuter genitive singular, which take *s*, the neuter dative singular, which receives an *e*, and the dative of masculine and neuter plurals terminating in *s*, which is changed into *en*. Proper names are declined only with the prepositions *van* and *aan*, but have a possessive case in *s*, which is usually connected with it, and separated by an apostrophe only when the name ends in a long vowel; thus, *Pieters boek*, Peter's book, and *Attila's dood*, Attila's death. The Dutch forms compound words with the same facility as the German. It is rich also in diminutives ending in *je*, and forms feminines either by adding *in*, as *een keizer*, an emperor, *eene keizerin*, an empress; or by changing the termination *er* into *ster*, as *een zanger*, a singer, *eene zangster*, a songstress; or by adding *es*, as *een baron*, a baron, *eene barones*, a baroness; or by changing *man* into *vrouw*, as *een koopman*, a merchant, *eene koopvrouw*, a woman merchant. The declension of adjectives is limited to their taking an *e* when preceded by an article terminating in *e* or *er*, or *en* when the article ends in *en* or *es*: thus, *des goeden mans*, of the good man; *der goede vrouw*, to the good woman; *den goeden kinderen*, to the good children. Adjectives are compared by adding *er* for the comparative and *st* for the superlative; but if the adjective ends in *r* in the positive, the comparative is formed by adding *der*. The principal personal pronouns are *ik*, I; *wij*, we; *gij*, thou or you; *hij*, he; *zij*, she; *het*, it; and *zij*, they: the possessives, *mijn*, my or mine; *uw*, thy or thine; *zijn*, his; *haar*, her or hers; *onze*, our or ours; *hun*, your or yours; *haar*, their or theirs: the interrogatives, *wie*, who; *wat*, what; *welke*, *welk*, which; *hoedanige*, *hoedanig*, which (what kind): the demonstratives, *deze*, *dit*, this; *gene*, that; *die*, *dat*, that; *degene* or *diegene*, he who. These are all declined more or less after the manner of the definite article. The first ten cardinal numbers are *één*, *twee*, *drie*, *vier*, *vijf*, *zes*, *zeven*, *acht*, *negen*, and *tien*; from which ordinals are formed by adding *de* or *ste*, as *de vierde*, the fourth, *de achtste*, the eighth.—The infinitive ends in *en*, and whatever precedes this termination is the root of the verb. The indicative present consists of the root itself, with a final *t* in the second person singular and plural and the third person singular, and with the addition of *en* in the first and third persons plural. The imperfect of the indicative and the subjunctive is formed by adding *de*, except when the root ends in *f*, *p*, *k*, *s*, *t*, or *ch*, when *te* is added instead; and when the root ends in *tt* or *dd*, *e* is inserted before the *de*. The present participle is formed by adding *de* to the infinitive, and the past participle by prefixing *ge* (generally) and adding *d* or *t*. The subjunctive present is formed by adding *e* to the root, and the imperative is the root itself. There are four auxiliary verbs: *hebben*, to have;

zijn or *wezen*, to be; *zullen*, to be bound (to be about); and *worden*, to become (to be). The inflection of a regular verb, therefore, is as follows: Active infinitive, *beminnen*, to love; present participle, *beminnende*, loving; past participle, *bemind*, loved; indicative present, *ik bemîn*, I love; imperfect, *ik beminde*, I loved; past indefinite, *ik heb bemind*, I have loved; pluperfect, *ik had bemind*, I had loved; future, *ik zal beminnen*, I shall love, *ik zal bemind hebben*, I shall have loved; conditional, *ik zoude beminnen*, I should love; conditional past, *ik zoude bemind hebben*, I should have loved; imperative, *bemin*, love; subjunctive present, *dat ik beminne*, that I may love; imperfect, *dat ik beminde*, that I might love; passive infinitive, *bemind worden*; participles, *bemind wordende*, *bemind geworden*; indicative present, *ik word bemind*, I am loved; imperfect, *ik werd bemind*, I was loved; past indefinite, *ik ben bemind geworden*, I have been loved, *ik was bemind geworden*, I had been loved; future, *ik zal bemind worden*, I shall be loved; future perfect, *ik zal bemind geworden zijn*, I shall have been loved; conditional, *ik zoude bemind worden*, I should be loved, *ik zoude bemind geworden zijn*, I should have been loved; imperative, *word bemind*, be loved; subjunctive, *dat ik bemind worde*, that I may be loved; imperfect, *dat ik bemind wierde*, that I might be loved; past indefinite, *dat ik bemind geworden zij*, that I (may) have been loved; pluperfect, *dat ik bemind geworden ware*, that I had been loved. Neuter verbs are conjugated with *hebben* when an action is implied, and with *zijn* when expressing a state of existence. The word *it* used in English for impersonal verbs is expressed in Dutch by *het*; but when used in the combination "it is," it is expressed by *daar* or *er*: thus, *het regent*, it rains; *daar* or *er is*, it is. There is a multitude of irregular verbs; their prominent features are, that one class having *ij* in the infinitive take *e* in the imperfect and participle, as *blijven*, to remain, *bleef*, *gebleven*; another with *e* or *i* in the infinitive takes *o* in the imperfect or participle, as *binden*, to bind, *bond*, *gebonden*; a third with *e* in the infinitive and participle has short *a* in the imperfect, as *meten*, to measure, *mat*, *gemeten*; a fourth with *a* in the infinitive and participle has *oe* or *ie* in the imperfect, as *dragen*, to carry, *droeg*, *gedragen*, and *slapen*, to sleep, *sliep*, *geslapen*; a fifth with long *e* in the infinitive has short *a* in the imperfect, long *o* in the participle; a sixth with short *e* in the infinitive has *ie* in the imperfect and short *o* in the participle; a seventh changes only the participle; and an eighth, specially known as irregular verbs, changes both the consonant and the vowel of the root in the imperfect and the participle, as *staan*, to stand, *staand*, *gestaan*; *kunnen*, to be able, *konde*, *gekonnen*. Prepositions, with few exceptions, govern the accusative.—LITERATURE. The first development of the vernacular literature of the Netherlands was Flemish rather than Dutch. The begin-

ning of Dutch literature proper (besides which the Netherlands boast of a host of eminent writers in Latin, embracing such names as Erasmus, Grotius, Chr. Huygens, Spinoza, and Boerhaave) dates from the 16th century. But as early as the beginning of the 15th literary persons formed associations for holding poetical tournaments and giving theatrical representations. They were known as the chambers of the *rederijkers*, presumably so called after the French *rhétoriciens*, which term then signified nearly the same as "poet." Only the *rederijkerskamer* of Amsterdam attained the character of a literary academy. Three members of it, Coornhert (1522-'90), Spiegel (1549-1612), and Roemer Visscher (1547-1620), may be considered the real founders of modern Dutch literature. Coornhert's productions are mostly treatises on morality and theology and poems. The posthumous poem of Spiegel, the *Hartspiegel*, is ethical. This triumvirate rendered great service by the grammatical works published under their direction by the Amsterdam *kamer*. Linguistic labors of still greater importance were the *Thesaurus Teutonicæ Linguae* by the celebrated printer Plantin (1514-'89), and the *Etymologicum Teutonicæ Linguae* by Cornelis van Kiel (Cornelius Kilianus). At the beginning of the 17th century, and for many years later, Holland, a powerful, wealthy, and free commonwealth, was preëminently the literary country of Europe. The devotion of the learned to the ancient languages was ardent and almost without parallel elsewhere; but a golden age of vernacular literature was ushered in by P. C. van Hooft (1581-1647), who gave a sweetness and harmony before unknown to Dutch speech. His amatory and Anacreontic lines have not been excelled by any later writer; and his *Nederlandsche Historien*, embracing the years between 1555 and 1587, is a model of stately historical narrative. Jacob Cats (1577-1660), or "Father Cats," as his countrymen love to style him, wrote for the multitude, and became their favorite. But J. van den Vondel (1587-1679) is the greatest poetical name of the century. He wrote much, dramas, lyrics, and satires, and had a multitude of disciples and imitators, one of the best of whom is Antonides van der Goes (1647-'84). J. Oudaan (1628-'92) is the author of two dramas worthy of note, *Johanna Gray* and *Koning Konradijn*; and other dramatic writers are Bredero (died in 1618), S. Coster, W. van der Nieuwelandt (1584-1635), the Fleming J. Zevecot (1604-'46), whose *Belegh van Leyden* ("Siege of Leyden") may still be read with pleasure, and L. Rotgans (1645-1710), whose dramas are much better than his tedious epic, *Willem III.* A man of large learning and much descriptive talent, C. van Huygens (1596-1687), produced some not unpleasing didactic poems, like the *Zedenprinten* ("Pictures of Manners"), *Hofwijk*, and *Voorhut*, which with others he included in a collection bearing the title of *Korenbloemen* ("Blue-

bottles"). A rhymed narrative, the *Masker van der Wereld*, by the Flemish Jesuit A. Poirtiers (1606-'75), was once very popular. The *Lof der Geldzucht* ("Eulogy of Avarice") and the domestic elegies of J. de Dekker (died in 1663) are still frequently quoted; *Roselijns Oochies* is a pretty idyllic effusion by Joncktyns (born 1600); and the pastoral poems of Wellekens (1658-1726) are graceful and imaginative. The almost universal use of Latin, as a language through which a vastly larger audience could be reached, left little room for Dutch prose. Several translations of the Bible, both from the original tongues and the Vulgate, some Biblical commentaries, and other theological treatises, met with a wide circulation. The *Batavische Arkadia* of J. van Heemskerk (1597-1656), suggested by the *Decamerone* of Boccaccio, is the only work that deserves the name of a romance. Besides Hooft, the historians are P. C. Bor (1559-1635), E. van Meteren (1535-1612), L. van Aitzema (1600-'69), and G. Brandt (1626-'85). The Dutch navigators, as Barentz and Heemskerk in their search for a northeast passage, Gerritszoon in the Australian regions, and Noort and Spilbergen in the extreme Orient, added much to geographical knowledge in this century. Many of these explorers wrote narratives of their voyages, versions of which appeared in various languages. Among these works are J. Nieuwhof on China (1665), P. Baldeus on Ceylon and Malabar (1672), M. G. de Vries on Japan (1646), G. Schouten on the East Indies (1696), C. de Bruyn on eastern Europe and western Asia (1698-1711), and W. Bosman on Guinea (1704).—The 18th century offers a marked contrast to its predecessor. The literature of the 17th century gave way in the 18th to imitation of French models. Few authors escaped this contagion. One of these is H. C. Poot (1689-1733), the farmer poet, whose style is pure and natural, and whose erotic and idyllic verses are marked by ease and liveliness. His most striking pieces, perhaps, are *Wachten* ("Watching") and *Landleven* ("Rural Life"). A Biblical epic which has considerable merit, but which was followed by bad imitations, is the *Abraham de Aartsvader* of A. Hoogvliet (1687-1763). The *Rottestroom* of D. Smits (1702-'52) also originated a school known as the stream poets, who sang the beauties of all the Dutch rivers. Of the two brothers W. van Haren (died in 1768) and O. Z. van Haren (died in 1779), the elder left a legendary, knightly tale in verse, *Gevalen van Friso*, and some lighter compositions, among which are *Leonidas*, *Menschelijk leven* ("Human Life"), and the *Hof van den vrede* ("Court of Peace"); the younger was the author of two tragedies and a lyrical epic, *De Geuzen*, woven out of the popular national ballads. A sort of transition poetical period, the dawn of the day of Bilderdijk and Tollens, begins with 1780. It was initiated by J. Bellamy (1757-'86), whose *Roozje* is the most touching and beautiful bal-

lad in the language, and was further characterized by the astronomer P. Nieuwland (1764-'94), whose *Orion* is a stately and in some portions sublime epic, and by H. van Alphen (died 1803), whose poems for children have been frequently reprinted. The purest prose of the century is that of J. van Effen (1684-1735), who possessed not a little of the humor and grace of his model, Addison, of whose chief work his *Hollandsche Spectator* is an imitation. The romance style was developed by two women, A. Deken (1741-1804) and E. Bekker (1738-1804); their novels, written in conjunction, though somewhat diffuse, are successful pictures of Dutch life and manners. The lengthened *Vaderlandsche historie* of J. Wagenaar (1709-'73) is impartial and trustworthy, but the diction is rather dull and heavy. The other historians are G. van Loon (born 1683), S. Stijl (1731-1804), and A. van Kluit (1737-1807), who wrote a very learned *Historia Critica Comitatus Hollandiae et Zelandiae*, and a *Historie der hollandsche staatsregering*. The *Vaderlandsche woordenboek* (1785-1800), in nearly 40 volumes, by J. Kok, is a treasury of information concerning the history and topography of Holland. In philology L. Ten Kate (1674-1731) anticipated many of the ideas of Grimm and the later Teutonic school. He and B. Huydecoper (1695-1778), who edited one or two of the old Flemish chronicles, were of great service to their native tongue. D. van Hoogstraaten (1658-1724) attained some eminence as a lexicographer. In science the philosophers W. J. 's Gravesande (1688-1742), N. Hartsoeker (1656-1725), and P. van Musschenbroek (1692-1761) gained a European renown; as did those disciples of Boerhaave, P. Camper (1722-'89) and G. van Swieten (1700-'72).—The modern revival of Dutch letters is coincident with the French revolution, having fairly commenced some little time before the opening of the 19th century. Rhijnvis Feith (1753-1824) did much toward bringing in this new epoch; his reputation is still maintained by a series of admirable historical *Oden en gedichten*. The *Taal, Schilderkunst*, and other productions of C. Loots (1765-1834) resemble the style of Helmers, but are much superior in energy and force. E. A. Borgers (died in 1820), a theologian, A. Simons (died in 1834), and J. Kantelaar (1759-1821) have also left several tasteful and polished lyrics. But the greatest of modern, if not of all Dutch poets is Willem Bilderdijk (1756-1831). The most remarkable of his multitudinous works is an epic entitled *De ondergang der eerste wereld* ("Destruction of the First World"), of which only the first five books were completed. The same author's *Geschiedenis des vaderlands*, in prose, was published after his death by B. F. Tijdeman. Another very popular poet is H. C. Tollens (1780-1856); especially admirable are his narrative poem *De oerwintering der Hollanders op Nova Zembla*, an account of Barentz's famous expedition in 1594-'6, his tragedy *De*

hoekschen en kabeljaauwschen, and his stirring national lyric, the *Wapenkreet*. The example and influence of Bilderdijk and Tollens have given rise to a number of minor bards. Some of the most meritorious are J. F. Bosdijk (died 1850); B. H. Lulofs (1787-1849), author of the *Watersnood*; W. Messchert (died in 1844), whose *De goude bruiloft* is justly praised; H. A. Spandaw (died in 1855), of whose works the *Neêrlands zeeroem* and the *Vaderlandsche poezij* are popular; W. de Clercq (1793-1844), a celebrated improvisator; J. Immerzeel (1776-1841), also known for his biographies of the artists; B. Klijn (1764-1829); A. C. W. Starling van den Wildenborch (1767-1840), the best modern humorist, of whose peculiar manner his *Iamben* and *Zephir en Cloris* are good examples; and P. Moens (1767-1843). Modern lyrical and descriptive poets are I. da Costa, a Jew, who after the decease of Tollens occupied the highest place in the modern Dutch Parnassus; C. G. Withuys, S. J. van den Bergh, J. van Beers, J. A. Alberdingk Thijm, L. van den Broek, and J. J. L. ten Kate. Among those who wrote for the stage in the latter part of the last century were S. J. Wiselius (1769-1845), J. Nomsz, J. van Walré (1759-1837), H. H. Klijn, and A. Loosjes (1761-1818), the last of whom also gave to the world some pleasant tales and sketches. Still later dramatists are the prolific comedy writer Ruysch and J. Hilman. The novels of E. Kist (1753-1822) and A. Fokke (died in 1812) are still much read; but they have been excelled by the romances of J. van Lennep (1802-68), a son of D. J. van Lennep (1774-1853). His fame was established by his *Nederlandsche legenden*, and his popularity was increased by the novels *De roos van Dekama* and *De lotgevallen van Klaasje Zevenster*. Several of his works have been translated into English. He seems to have successfully combated the undue love in his country for imitations of French standards. He selected Byron and Walter Scott as his models, and his novels and historical romances show that he did not servilely copy them, but strove to retain a truly national spirit. Van der Hage is his equal in historical narrative, but is not as felicitous in pure fiction, wherein Adriaan Bogaers stands much nearer to him in talent and fame. Bogaers's most celebrated productions are *Jochebed* and *De togt van Heemskerk naar Gibraltar*. Novelists of note of recent times, among others, are Schimmel, the author of *Mary Hollis*, Hofdijk, and Ten Brink, who has written masterly descriptions of colonial life in the East Indies. The names of Da Costa, Van Oosterzee, Schultjes, Ter Haar, and Tiedeman have won distinction for theological learning. Jurisprudence and political economy have been ably represented by Den Beer Poortugael, Noordziek, De Bruyn Kops, Heineken, Den Tex, and Wintgens. Valuable medical works have appeared from the pens of Donkersloot, Cornelius, Huet, Eschauzier, and Berns. Chem-

istry, pharmacy, and the natural sciences generally have been enriched by the labors of Bleeker, Harting, Van Otterloo, Vorsterman van Oijen, Suringar, Opwyda, Luijten, and Mulder. Philosophical works have been contributed among others by Kinker, Heringa, Vitringa, Wijek, Spruyt, Opzoomer, Burger, and Snellen. Steijn Parvé, Bleek van Rijsewijk, and Vorstman have written on the science of education. Ancient and oriental languages, as well as mythology and archæology, have received fresh contributions from Van Herwerden, Boot, Francken, Van Cappelle, Ekker, Rijnenberg, Grashuis, Kroon, and De Goeje. Numerous books have appeared to facilitate the study of modern languages. Among them are specially noteworthy Halbertsma's *Lexicon Frisicum*, Oudemans' *Bijdrage tot een middel- en oud-nederlandsch woordenboek*, and Winkler's *Algemeen nederduitsch en friesch dialecticon*. The present period has produced an abundance of historical, geographical, and ethnological works. Bladzijden's *Uit de geschiedenis van Neêrlands roem en grootheid*, Kemper's *Geschiedenis van Nederland na 1830*, Muller's *De Staat der vereenigde Nederlanden in den jaren zijner wording 1572-94*, Hofdijk's *Het nederlandsche volk geschetst in de verschillende tijdperken zijner ontwikkeling*, and Elbert's *Leven van Willem den Eersten, Prins van Oranje*, have thrown considerable light on the history of the Netherlands. Other historical works of value have been contributed by Nugens, Wijne, Veth, Van den Bergh, Ter Haar, De Jonge, Meinsma, Witkamp, Doorenbos, Groen van Prinsterer, Gericke van Herwijnen, Van Vloten, and Vreede. Among works on mathematical, mechanical, and military science, Kuipers's *Geschiedenis der nederlandsche artillerie van de vroegste tijden*, Wageningen's *Leerboek der analytische meetkunst*, Reuven's *De Waal en Rijndijken*, and Grothe's *Mechanische technologie* may be mentioned as excellent compendiums of the special branches.—See Mone, *Uebersicht der niederländischen Volksliteratur älterer Zeit* (Tübingen, 1838); Jonckbloet, *Geschiedenis der midnederlandsche letterkunde* (Amsterdam, 1851 et seq.); Hofdijk, *Geschiedenis der nederlandsche letterkunde* (1856); and Van Vloten, *Schets van de geschiedenis der nederlandsche letteren* (1871).

NETSCHER, Gaspar or Kaspar, a Dutch painter of German origin, born in Heidelberg about 1639, died at the Hague, Jan. 15, 1684. He was the son of a sculptor, who had fled from persecution in Bohemia, was a pupil of Koster at Arnhem, and afterward of Gerard Terburg, lived some years in Bordeaux, where he married, and in 1661 settled at the Hague. He excelled in genre pictures and portraits.—His sons, THEODORE (1661-1732) and CONSTANTINE (1670-1722), were also eminent painters, especially of portraits. The former was born in Bordeaux, lived in England from 1715 to 1722, was popular at court, and became rich.

NETTEMENT, Alfred François, a French author, born in Paris, July 22, 1805, died there, Nov. 15, 1869. He founded at Paris in 1848 *L'Opinion publique* newspaper, which was suppressed after the *coup d'état* of Dec. 2, 1851, when he was arrested with other opposition members of the legislative assembly. He published a great number of historical, biographical, and miscellaneous works, including *Mémoires sur la duchesse de Berri* (3 vols., 1837); *Essai sur le progrès du Catholicisme en Angleterre*, with a translation of Cardinal Wiseman's lectures (2 vols., 1839); *Histoire de la littérature française sous la royauté de juillet* (2 vols., 1854); *Histoire de la conquête d'Alger* (1856), which obtained in 1869 the second Gobert prize; and *Histoire de la restauration* (8 vols., 1860-'72).—His brother FRANCIS (born in 1808) has published *Nouvelle Histoire de la révolution de 1789* (2 vols., 1862), and other writings.

NETTLE (Ang. Sax. and Dutch, *netel*), the name of plants of the genus *urtica*, distinguished for the stinging quality of their minute hairs. Prior shows that the word in different languages originally meant "that with which one sews," the Germanic and Scandinavian nations having in former times used the nettle fibre as thread, as was done by the Scotch in the 17th century. The genus *urtica* (the classical Latin name, from *urere*, to burn) gives its name to the family *urticaceæ*, as to the limits of which there is a great difference of opinion; while some botanists make the *urticaceæ* a very comprehensive order, including as subfamilies the elms (*ulmaceæ*), the breadfruits, mulberries, and figs (*artocarpeæ* and *moreæ*), the nettles and allied genera (*urticeæ*), and the hop and hemp (*cannabineæ*), others regard these as entitled to rank as families, and restrict the *urticaceæ* to some 40 genera allied to the nettles. The genus *urtica* consists mostly of herbaceous plants (a few are trees), all supplied with stinging hairs; they have a bland, watery juice, and a tough, fibrous bark; the leaves are opposite, and the flowers are monœcious or dioecious. Belonging to the apetalous division of exogenous plants, the structure of the flowers is exceedingly simple; the staminate flower consists of four sepals and stamens, in the centre of which is the cup-shaped rudiment of a pistil; the pistillate flower has four sepals, the two inner of which are larger, enclosing the one-celled ovary, which in fruit is an akene, surrounded by the membranaceous enlarged inner sepals. The stinging hair of the nettle, when magnified, is seen to consist of a single cell, bulbous at the base, where it is surrounded by cells of the epidermis, and terminated by an exceedingly sharp and fragile point, which breaks off after entering the skin and allows the irritating juice contained in the cell to flow into the wound. If the plant be grasped roughly, the hairs are broken off before the point can penetrate the skin, and little or no pain results. There are but five species of *urtica* proper in the Atlantic states, and two of these are intro-

duced from Europe. The common small nettle of Europe (*U. urens*), which is chosen to illustrate the genus, is found near dwellings in the older states; it is a monœcious, annual species, 8 to 12 in. high, with not very numerous stings. The other introduced species is the common



Small Nettle (*Urtica urens*), showing Staminate and Pistillate Flowers.

nettle (*U. dioica*), a perennial, 2 to 3 ft. high, with its staminate and fertile flowers in much-branched spikes on different plants; this is so well armed with stings that, as the old herbalist Culpepper quaintly remarks, "it may be found by feeling on the darkest night." Of the indigenous species, the slender nettle (*U. gracilis*) is a perennial, 2 to 6 in. high; *U. capitata* is a southern species, 3 to 5 ft. high; and *U. chamaedryoides*, from 6 to 30 in. high, with dense globose flower clusters, is western and southern. The young shoots of nettles are used to some extent in this country, but more in Great Britain, as a pot herb or greens, and in former times the plants were blanched by earthing up, as is now practised with sea kale. Animals will not eat living nettles, unless the plants are very young; but when made into hay they are eaten readily, and they are regarded as so productive of milk that in Sweden and Russia they are sometimes cultivated as fodder plants. The fibre of the plants is considered superior to that of flax, but on account of its small quantity and the difficulty of separating it, little nettle cloth is now made; in the northern parts of Europe the fibre is used for fish lines and other small cordage, and to some extent for fabrics. Several tropical species are useful for their fibres. An Australian species, *U. gigas*, is a tree 120 to 140 ft. high, with leaves 12 to 15 in. broad, which are abundantly furnished with stings and capable of causing great suffering. Stinging with nettles to "let out melancholy" was prescribed by the old writers. The devil's-leaf, *U. urentissima* of Timor, is so violently poisonous that

its effects last for many months, and sometimes cause death. The wood nettle, formerly *U. Canadensis*, but now placed in the genus *Laportea*, has been called American ramie. A closely related genus, *pilea*, includes the richweed, *P. pumila*, formerly *U. pumila*, a smooth plant with translucent stems, quite common in moist and shady places.—The false nettle, *Bahmeria cylindrica*, which is common in moist ground all over the country, has the general aspect of the nettles, but is without stings; to this genus belongs the plant furnishing the China grass, and better known in this country as ramie. (See RAMIE.) Nettle tree is one of the names of *celtis occidentalis*. (See HACKBERRY.) Dead nettle is the common name for plants of the labiate genus *Lamium*.

NETTLE RASH (*urticaria*), an eruptive disorder characterized by the appearance of patches whiter or redder than the surrounding skin, and attended with intense itching. The disease has been divided into three varieties: *urticaria febrilis*, *U. evanida*, and *U. tuberosa*. The febrile variety is preceded by a feeling of general uneasiness, headache, nausea, and vomiting. These symptoms are followed by a troublesome itching and the appearance of an eruption, commonly most abundant about the shoulders, loins, or thighs. The patches are irregular in size and form, sometimes rose-colored with whitish border, sometimes white with rose-colored border, sometimes few in number, sometimes covering the greater part of the surface, and giving rise on the face to great disfigurement and a feeling of stiffness and tension. The patches are evanescent, rapidly disappearing, but only to give place to a new eruption. For the first day or two the disease is apt to be attended with a little fever, but this soon subsides, and after a variable time, generally about a week, the eruption disappears, leaving no traces. In *U. evanida* there is no febrile movement, and the disease is frequently chronic, the eruption often appearing and disappearing several times a day, and frequently assuming the appearance of long wheals as if produced by a whip. *U. tuberosa* is the rarest and the most severe of the forms of nettle rash, in which the eruption is in the form of red swollen patches of the breadth of the hand, attended with an intolerable itching. The patches extend deeply into the skin, are numerous, and produce a very disagreeable feeling of swelling and stiffness. The rash commonly shows itself in the evening to disappear in the morning, leaving a sense of weakness and prostration. It occurs chiefly in habits impaired by excess, and its course is often tedious and intractable.—Nettle rash is most common in nervous persons with a delicate and irritable skin, and consequently in women and children. Its most frequent cause is some irritation of the digestive organs; with some persons the use of a particular article of diet is invariably followed by an eruption of nettle rash, the offending article

varying greatly in different cases, and only to be detected by experience. There are some ordinary articles of diet, as mussels, crabs, several of the richer varieties of fish, &c., which act as true poisons in certain individuals, producing a violent eruption of *urticaria*. Here the symptoms are often excessively severe, the patient suffering from intense headache and giddiness, violent nausea and vomiting, colicky pains in the stomach and bowels, free purging, &c. Sometimes there are violent pains in the back and limbs, sometimes a total loss of sensation and motion. The febrile reaction is often severe, and the eruption is general, attended with great swelling and violent itching and tingling. In ordinary febrile *urticaria*, rest, attention to diet, a cooling regimen, and the use of the tepid bath, are all that is necessary. Occasionally an alkaline wash may be found useful in relieving the itching. *U. evanida* is an intractable complaint, and is best treated by strict regulation of the diet. In the severer forms of nettle rash produced by fish poisoning, the poison should be got rid of by stimulating emetics.

NETTLETON, Asahel, an American clergyman, born in North Killingworth, Conn., April 21, 1783, died May 16, 1844. He graduated at Yale college in 1809, studied theology, and in 1817 was ordained. He had intended to become a missionary, but the effect produced by his preaching was so powerful that he was induced to engage in evangelization at home. He preached revivals with great success in more than 40 towns in Connecticut, Massachusetts, and New York. In 1822 he had an attack of typhus fever, from which for a long time he was not expected to recover. He resumed his active labors in 1824, and in the same year published a volume of "Village Hymns." In 1827 he went to Virginia for the sake of his health, and returning in 1829 preached in New England and New York till 1831. In the spring of that year he went to England, also visiting Scotland and Ireland. Returning in 1832, he was appointed professor of pastoral duty in the newly organized theological seminary at East Windsor; he did not accept the office, but took up his residence in the place, and lectured occasionally. In later life he opposed the doctrinal views of the New Haven school of theology.

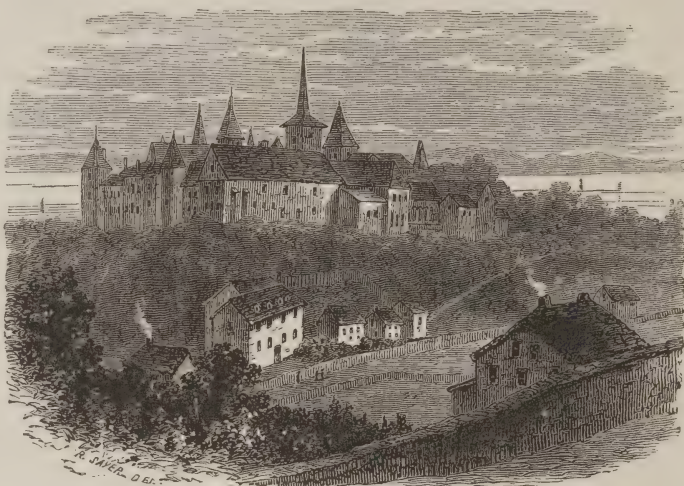
NETTLE TREE. See HACKBERRY.

NEU-BRANDENBURG, a town of Germany, in the grand duchy of Mecklenburg-Strelitz, at the N. E. extremity of the Tollens lake and on the Hamburg and Stettin railway, 53 m. W. N. W. of Stettin; pop. in 1871, 7,245. It has a gymnasium, a *Realschule*, four beautiful Gothic gates, two churches (one of which, the Gothic church of St. Mary's, has recently been restored), a theatre, and a palace. The chief manufactures are tobacco, chemical products, playing cards, cottons, and woollens, and there is a large trade in wool.

NEU-BREISACH. See BREISACH.

NEUCHÂTEL, or *Neuchâtel* (Ger. *Neuenburg*).
I. A W. canton of Switzerland, consisting of the former principality of Neuchâtel and the county of Valengin or Valendis, bounded N. and N. E. by the canton of Bern, S. E. by Fribourg and Vaud, S. by Vaud, and W. and N. W. by France; greatest length 36 m., greatest breadth $13\frac{1}{2}$ m.; area, 312 sq. m.; pop. in 1870, 97,284. Several ridges of the Jura mountains traverse the canton. The lake of Neuchâtel, 28 m. long, 7 m. wide, and 400 ft. deep, separates the canton from Fribourg and Vaud, and is connected with the Rhine by several smaller lakes and streams. Wine, fruit, hemp, flax, and grain are the principal products, but the grain crop is not sufficient for home use. The raising of cattle is the most important branch of rural industry. With the exception of about 11,500 Roman Catholics, 1,000 of other Christian denominations, and 700 Jews, the people belong to the Reformed church. French is the prevailing language. Watch making (chiefly at Chaux-de-Fonds and Le Locle), lace making, and cotton manufacture are the leading industrial pursuits. The constitution of the canton is democratic.—Neuchâtel belonged to Burgundy until 1032, when it became part of the German empire. After having been a fief of the counts of Fribourg and the margraves of Hochberg, it became a possession of the Longueville family, and after its extinction in 1707 was inherited by Frederick I. of Prussia, as successor to the rights of the house of Orange. It remained under the house of Hohenzollern as a principality with a separate government till 1806, when Napoleon received it in exchange of territory from Frederick William III., and gave it as a principality to Marshal Berthier. In 1814 the king of Prussia regained possession of Neuchâtel, and procured its admission into the Swiss confederacy, it being the only canton with a monarchical constitution. In 1848 a revolutionary movement severed the connection with the house of Prussia; and an attempt of the royalist party in 1857 to reinstate the royal authority having been frustrated, the independence of the canton was at last recognized by Frederick William IV., May 26, 1857. **II.** A town, capital of the canton, at the embouchure of the river Seyon into the lake of Neuchâtel, 25 m. W. of Bern; pop. in 1870, 13,321. It is picturesquely built on a steep slope of the Jura, and contains many fine buildings. An

ancient castle on the heights has been converted into public offices; the Gothic church adjoining the castle contains a monument to the reformer Farel. There is a museum, with a fine picture gallery; a public library with 30,000 volumes, and having many manuscript



Castle of Neuchâtel.

letters of Rousseau; a college in which Agassiz was once professor; an observatory famous for its geodetical labors; an orphan asylum and two hospitals munificently endowed by private citizens, one of whom, David Pury, in 1786 left 4,000,000 livres to these institutions and for other public purposes; his statue stands in front of the gymnasium. The principal manufactures are clocks and watches, paper, lace, straw hats, and spirits.

NEUHOF, *Theodor von*, baron, a German adventurer, born about 1686, died in London, Dec. 11, 1756. He was the son of a Westphalian nobleman, studied in Cologne, was compelled to leave that city on account of having killed in a duel a young man of high family, and obtained a lieutenancy in the Spanish army in Africa. He fell into the hands of the Moors, and is believed to have been employed during 18 years as interpreter by the dey of Algiers. In 1735 he led two regiments, chiefly Tunisians and Algerians, to Corsica to assist that island against Genoa, and ingratiated himself so much with the Corsicans that they elected him king, April 15, 1736, under the name of Theodore I. He succeeded in securing the alliance of the Netherlands; but the French coming to the assistance of the Genoese in 1738, the Corsicans were again subdued, and Neuhof fled. In 1741, when the French left the island, he in vain endeavored to regain his power, and spent the remainder of his life in England, where shortly before his death he was released from prison by Walpole, who raised a subscription which enabled him to compromise with his creditors. There are other versions of Neuhof's life and

adventures, but the above is most generally credited. He left a son who assumed the name of Col. Frederick, was in the service of the duke of Würtemberg, published two historical works on Corsica, and shot himself in Westminster abbey, Feb. 1, 1796.

NEUILLY, a town of France, in the department of Seine, on the right bank of the river Seine, $1\frac{1}{2}$ m. N. W. of the enceinte of Paris; pop. in 1872, 16,277. The river is here crossed by a handsome bridge of five arches, each of 120 ft. span. The park, which extended for some distance along the Seine, was formerly a favorite resort of the Parisians, but has been cut up into villa sites. The principal object of interest is the ruined palace, once the property of the Orleans family, and the residence of Louis Philippe. It was destroyed by the populace, Feb. 25, 1848, with the exception of one wing. Louis Philippe adopted the title of count of Neuilly during his exile. Several encounters took place at Neuilly in 1871 between the army of the commune and the Versailles troops.

NEUKOMM, Sigismund, chevalier, a German composer, born in Salzburg, July 10, 1778, died in Paris, April 3, 1858. He was educated by his kinsmen Michael and Joseph Haydn, and became in 1804 leader of the orchestra of the German opera in St. Petersburg, but was soon obliged to resign on account of ill health. He returned to Vienna in 1808, and subsequently he lived in Paris, in the house of Talleyrand, whom he accompanied in 1814 to the congress of Vienna. In 1816 he went with the duke of Luxemburg to Rio de Janeiro, and became a teacher of music at the Brazilian court. In 1821 he returned to Talleyrand's house, and, after visiting Italy and other parts of the continent, accompanied his patron in 1830 to England. Subsequently he again travelled extensively, and spent several years in Switzerland. During the latter part of his life he was partially blind, and resided alternately in London and Paris. His oratorio of "Mount Sinai," produced at Derby in 1831, and "David," at Birmingham in 1834, are popular. He also produced an immense number of cantatas, songs, psalms, voluntaries for the organ, symphonies, quartets, sonatas, &c., his compositions, vocal and instrumental, amounting to more than 800.

NEUMANN, Karl Friedrich, a German orientalist, born of Jewish parents at Reichmannsdorf, near Bamberg, Dec. 22, 1798, died in Berlin, March 17, 1870. He studied at Heidelberg, Munich, and Göttingen, and in 1822 was appointed professor of history at Spire, but was compelled on account of his liberal views to retire. He next devoted several years to oriental languages, particularly the Chinese and Armenian, and in 1829-'30 visited China to make a collection of works by native authors. He returned to Europe with 10,000 volumes, besides about 2,500 for the royal library of Berlin. In 1831 he became professor at Munich, lecturing on the Armenian and Chinese languages, and on geog-

raphy, ethnography, and history. He joined the liberals during the commotions of 1847-'8, and in 1852 was removed from his professorship. In 1863 he took up his residence in Berlin. He wrote in German, French, and English, into which languages he made many translations from the Armenian and Chinese, and edited Gützlaff's *Geschichte des chinesischen Reichs*. Among his works are: *Mémoires sur la vie et les ouvrages de David, philosophe arménien* (Paris, 1829); "History of Vartan by Elisæus," and Vahram's "Chronicle of the Armenian Kingdom of Cilicia," from the Armenian (London, 1830); "Catechism of the Shamans," from the Chinese (1831); "History of the Chinese Pirates" (1831); *Pilgerfahrten buddhistischer Priester aus China nach Indien* (Leipsic, 1833); *Lehrsaal des Mittelreichs* (1836); *Asiatische Studien* (1837); *Geschichte des englisch-chinesischen Kriegs* (1846); *Die Völker des südlichen Russland* (1847); *Beiträge zur armenischen Literatur* (1849); *Geschichte des englischen Reichs in Asien* (2 vols., 1857); and *Geschichte der Vereinigten Staaten von Amerika* (3 vols., 1863-'66). A translation of his "Hoei-Schein, or the Discovery of America by Buddhist Monks in the Fifth Century," was published in London in 1874.

NEURALGIA (Gr. *νεῦρον*, nerve, and *ἄλγος*, pain), an affection of which pain is the essential and characteristic feature, without visible alteration of the tissues or organs in which it is seated, and which depends on some disease affecting the structure or function of the nerves or of their centres. The varieties of neuralgia are very numerous. Some are distinguished according to the nerve affected; as neuralgia of the trifacial nerve, commonly called tic douloureux; sciatica, or neuralgia of the sciatic nerve; intercostal neuralgia, affecting the intercostal nerves, &c. Other varieties are described according to the locality which is the seat of pain; as gastralgia, or pain in the region of the stomach; nephralgia, or pain in the region of the kidneys, &c. Other varieties again are indicated by the causes which produce them; as miasmatic neuralgia, the neuralgia caused by marsh miasm; saturnine neuralgia, the neuralgia produced by the poison of lead, &c. The causes of neuralgia may be classified as constitutional and local. The principal constitutional causes are: 1, an impoverished condition of the blood, resulting either from hæmorrhage or the exhausting effects of disease, such as fevers, chlorosis, &c.; 2, the miasm of paludal regions; 3, the *materies morbi* of rheumatism; 4, the virus of syphilis; 5, the circulation in the blood of poisonous secretions, such as urea and bile; 6, the poisonous effects of lead, and probably of some of the other metals; 7, the functional derangement of the nervous system in the disease known as hysteria. The local causes are: 1, inflammation of the delicate fibrous sheath which envelopes the nerves, called the neurilemma; 2, the development of tumors near the origin, or along the course, or

amid the ramifications of the nerves, as neuromata, fibrous tumors growing from the nerve sheath, and cancerous, aneurismal, cartilaginous, or bony tumors, so situated as to stretch or press upon the nerves; 3, the bulbous expansion of the extremities of divided nerves, occurring after amputation, and causing painful stumps; 4, the pinching of nerves in the cicatrices or scars of lacerated wounds.—The successful treatment of a neuralgia depends of course on a correct appreciation of the causes that produce it. Where it arises from constitutional causes, it is generally amenable to treatment. The neuralgia that depends on an impoverished state of the blood yields almost invariably to iron tonics, good diet, and outdoor exercise; that which arises from the effects of paludial poison disappears rapidly under the use of quinine; neuralgia of rheumatic origin is ordinarily controlled by the preparations of colchicum, the alkalis, alkaline and sulphur baths, &c.; while the neuralgia caused by lead poison has its specific antidote in the iodide of potassium, a remedy which is useful also in the neuralgia of syphilitic origin. The neuralgia which occurs in hysteria yields, like most of the protean phenomena of that disease, to the mineral tonics, electricity, shower baths, and exercise. Before speaking of the treatment of the forms of neuralgia caused by local disease, it is to be remarked that the seat of pain in these cases does not always correspond with the location of the cause of irritation. For instance, a tumor within the cranium may produce pain at the extremity of the sensitive nerves, near the origin of which it is located; or pressure in the course of a nerve may cause pain in its ultimate ramifications. Where neuralgia is caused by irritation near the origin of the nerves, in the brain or spinal cord, its radical cure is generally impracticable; where it depends on the pressure of tumors that can be removed, the pain will generally disappear with the removal of the cause. In inflammation of the nerve sheath, local counter-irritation, by cups, blisters, issues, setons, &c., usually gives relief, and generally effects a cure. The neuralgia of painful stumps and scars, and of obstinate cases of inflammation of the neurilemma, requires surgical interference, such as reamputation, removal of the cicatrix, or excision of a portion of the diseased nerve. Temporary relief may be given in all forms of neuralgia by the administration of powerful anodynes. Those most commonly used are morphine, the active principle of opium, and aconitine, the active principle of the *aconitum napellus* or monkshood. These may be used internally or externally. A solution of morphine injected into the areolar tissue beneath the skin, near the seat of the neuralgia, gives more prompt relief than when given by the stomach. Aconitine is generally used externally, in the form of an ointment, rubbed upon the affected part. In most cases it rapidly relieves the neuralgic pain.

NEUREUTHER, Eugen, a German painter, born in Munich, Jan. 13, 1806. He studied under his father, Ludwig Neureuther, was employed by Cornelius in the arabesques and other embellishments of the Trojan hall in the Glyptothek, and distinguished himself by illustrating Goethe. He visited Rome in 1837; from 1848 to 1856 he was director of the porcelain works in Nymphenburg, and subsequently became professor at the academy of Munich. Among his finest productions are designs after Wieland's "Oberon" in the Königsbau at Munich, and the external embellishments of the polytechnic institute, which was designed by his brother Gottfried, an eminent architect.

NEUROPTERA (Gr. *νεῦρον*, nerve, and *πτερόν*, wing), an order of insects characterized by powerful jaws, four reticulated, membranous, naked wings, and the absence of sting or piercer. They include the dragon and May flies, ant lion, white ant, and similar predaceous insects, which undergo a complete or partial metamorphosis. The larvæ are six-legged, voracious and carnivorous, living in the water, on trees, or in the ground. Only the white ants and the wood ticks are injurious to vegetation; the others are rather beneficial to man by devouring aquatic and flying insects, plant lice, and similar pests. They are generally of elegant proportions, often prettily marked, and possess great powers of flight. Kirby separated the May or caddis flies (*phryganeæ*), and formed of them his order *trichoptera*. It is commonly believed that the ravages of white ants and their congeners are confined to tropical regions and to dead or decaying vegetation; but a few years ago a white ant, allied to the genus *termes*, was discovered at Salem, Mass., making its mines and galleries, destroying with its colonies the roots of grape vines in greenhouses, and making chambers even in the living wood.

NEUSATZ (Hung. *Újvidék*), a town of S. Hungary, in the county of Bács, on the left bank of the Danube, connected by a bridge with the opposite fortress of Peterwardein; pop. in 1870, 19,119. A United Greek bishop resides here, and the town contains an Armenian and several Greek, Roman Catholic, and Protestant churches, a synagogue, and a gymnasium. It was strongly fortified and prosperous until June 11, 1849, when it was stormed by the Austrians under Jellachich, and almost destroyed by the fire of the Hungarians from Peterwardein. It rapidly recovered, however. N. of the town is a line of Roman ramparts, erected by Trajan, which extends about 20 m. to the Theiss.

NEUSE, a river of North Carolina, rising in Person co., in the N. part of the state. It flows generally S. E. about 300 m., and empties into Pamlico sound through an estuary several miles wide in the lower part and about 50 m. long. It is navigable by steamboats eight months of the year for more than 100 m. The most important place on its banks is New Bern, at the mouth of its chief tributary, the Trent.

NEUSIEDLER LAKE (Hung. *Fertő*), after Balaton the largest lake of Hungary, situated near the Austrian frontier on the confines of the counties of Oedenburg and Wieselburg; length about 23 m., breadth 7 m., depth 9 to 13 ft. The reedy banks of the lake shelter innumerable water fowl. The E. side is marshy, adjoining the extensive marshes of Hansaság. In times of sudden inundations the overflowing waters are carried through an artificial canal into the river Rabnitz. The W. bank is surrounded by beautiful vine-clad hills, at the foot of which the town of Rust is situated. Other towns W. of the lake are Oedenburg and Eisenstadt. The lake dried up in 1865, as it had in 1693 and 1738, and the archduke Albrecht laid out a plantation there which he called Neu-Mexico. In September, 1870, the basin was again filled with water from the Raab and Rabnitz rivers, through the Hansaság marsh, the draining of which had been undertaken in 1865, and the farms and buildings were all submerged.

NEUSS, a fortified town of Rhenish Prussia, in the district of Düsseldorf, on the Erft, near its confluence with the Rhine, 21 m. N. W. of Cologne; pop. in 1871, 13,992. The Roman Catholic cathedral is a fine specimen of the architecture of the 13th century, and has been repeatedly restored. The town contains a Roman Catholic gymnasium and a Protestant church. It is a free port and the principal emporium of Rhenish Prussia in the corn trade, and produces more rape oil than any other town of Germany. There is also a large trade in coal, and the cattle fairs are largely attended. There are several manufactories of machinery and other articles. The Romans had a fort here (*Novesium*). Charles the Bold of Burgundy besieged Neuss in July, 1474, to assist Bishop Ruprecht of Cologne against his contumacious see. He withdrew after 11 months, having lost 10,000 men, on the appearance of the imperial army under Frederick III.

NEU-STRELITZ, a town of Germany, capital of Mecklenberg-Strelitz, on the E. side of Lake Zierke, 57 m. N. N. W. of Berlin; pop. in 1871, 8,470. The streets are broad, and converge into the market square. The palace is surrounded by fine pleasure grounds. There are two churches, a gymnasium, a library of 70,000 volumes, and collections of German antiquities and coins. About 2 m. S. of Neu-Strelitz is Alt-Strelitz, the former capital.

NEUSTRIA, the name of the western division of the Frankish empire under the Merovingians and Carolingians, from the partition of the provinces by the sons of Clovis in 511 to the beginning of the 10th century. In the earlier part of that period Neustria extended from the Meuse, which formed its boundary toward Austrasia, the eastern division, to the ocean and the Loire, which separated it from Aquitania. The principal towns were Soissons, Paris, Orleans, and Tours. In later times

it was restricted to the territories lying between the Seine and the Loire. The name disappeared when the maritime territory was ceded to the Normans (912), receiving the name of Normandy. (See FRANCE, vol. vii., p. 379.)

NEUTERS, a tribe of American Indians formerly living on both sides of the Niagara between the Hurons and Iroquois, to whom they were related, and remaining neutral in the war between those tribes, whence the name given them by the French. The Hurons called them Attiwandaronk. The Recollects in 1629, and subsequently the Jesuits, attempted missions among them without success. They informed the Recollects of the existence of oil springs in that part of the country. After the overthrow of the Hurons in 1649, the Neuters were attacked by the Iroquois, who killed many and incorporated the rest among the Five Nations of their league.

NEUTRA (Hung. *Nyitra*). **I.** A county of Hungary, bordering on Moravia and the counties of Trentschin, Turóc, Bars, Comorn, and Presburg; area, 2,219 sq. m.; pop. in 1870, 361,005, mostly Slovaks and Roman Catholics. It exceeds all other Hungarian counties in the production of sheep and cattle, and the commerce with Moravia is very active. It is watered by the Waag, Neutra, and March, and most of the soil is very fertile. Much wine is produced, of which the best is the red Neustädter. Woollen, cotton, and linen goods, and other articles, are manufactured. **II.** A town, capital of the county, on the river Neutra, 70 m. N. W. of Pesth; pop. in 1870, 10,683. It is the seat of a Roman Catholic bishop, and contains a cathedral, situated within a fortress on high ground, several convents, a theological seminary, and a gymnasium. In 1663 it was taken by the Turks, and in 1708 by the imperialists from the partisans of Rákóczy.

NEUTRALITY, in international law, the indifferent and impartial posture maintained by one nation with regard to others which are at war. "The neutral state," says Klüber, "is neither judge nor party." It may be the common friend of both belligerents, but may not favor either. The character of neutrality is generally impressed upon a nation only by the event of war, while in time of peace it may conclude offensive and defensive alliances, and in all respects arrange at its pleasure its relations with other states. Yet there may be what is called a permanent neutrality. Switzerland and Belgium by the existing arrangements in Europe, established in the case of the former by the declaration of the allied powers in 1815, and of the latter by the negotiations which established its independence in 1831, are to remain always neutral and independent of any complications which may in the future arise among the other European powers. These states, it is evident, cannot even in peace enter into any compacts or engagements which would be inconsistent with complete neutrality in case of war.—It is not a violation of neutral-

ity to furnish one only of two hostile parties with ammunition or other war supplies, provided this be done in accordance with previous treaty stipulations. Thus, by the treaty of 1788 with the United States, France secured the exclusive privilege of asylum in American ports for her privateers and their prizes. But in this case, as usually, such a qualification of neutrality, though clearly sanctioned by the law of nations, did not fail to provoke complaint and protest from the less favored power. It is not consistent with a neutral character to concede to one belligerent, to the exclusion of others, the liberty of raising land or sea forces within the neutral territory. This privilege the United States refuse to all belligerents alike, and the prohibition is declared by a permanent act of congress; and any attempt by a foreign power to obtain enlistments in this country would be regarded as an unfriendly act, and if aided or connived at by its diplomatic representative would be deemed a justification of a demand for his recall, as in the case of the British minister, Sir John Crampton, in 1855.—The perfect inviolability of its territory is the clearest if not the chief among the rights of a neutral state. A belligerent therefore cannot attack his enemy on neutral ground, and, in spite of a condemnation by a prize court of the captor, the neutral power will restore to its owner property captured within its jurisdiction. The neutral may refuse to all belligerents the privilege of passage over its domain, or must grant it, if at all, to all alike. It may forbid the entrance of war vessels and their prizes into its ports, although, in the absence of positive prohibition, the liberty to enter is implied. Our government has uniformly conceded this favor to the public ships of the hostile powers, without their prizes. To admit the entrance and sale of these in neutral ports is a favor which, in the opinion of eminent authorities, is hardly consistent with perfect neutrality, or with the dictates of true policy. As an illustration of modern practice in this respect, it may be added, that in the Crimean war Sweden and Norway and Denmark, adopting the same rules of neutrality, admitted into their ports the ships of war and of commerce of the belligerent parties, and accorded to them the facility of supplying themselves with all necessary stores and provisions not contraband of war, but forbade, except in cases of distress, the entrance, condemnation, or sale of any prize in any of the harbors of these kingdoms.—Whether the neutral can claim territorial immunity for its ships, whether in other words its flag shall protect the whole ship and cargo from the assertion of belligerent rights, has been a much vexed question in international law. The treaties concluded at Utrecht in 1713 had embodied the principle that the character of the vessel should determine that of its cargo; and though the same principle had been introduced into frequent conventions,

based upon these treaties, to which England had been a party, yet this power always refused to admit that express stipulations of this nature could change what it called the common law of nations in the premises. Except, therefore, when it was bound by special compacts, England has steadily maintained the integrity of the rule that enemy's goods on board a neutral ship are good prize of war. In 1781 the Baltic code of neutrality was first proclaimed by Catharine II. of Russia. One of its most prominent articles asserted the principle of the treaties of Utrecht, namely, that free ships should make free goods. The principal powers of Europe, excepting only England, acceded to the Russian rules of neutrality. The single influence of England against the code, however, was too great to be withstood, and it was abandoned in 1787. An attempt to revive it in 1801 was equally unsuccessful, and for the same reason. In its general jurisprudence the United States has, almost of necessity, adopted the English rule. But in its treaties, and particularly in those with American powers, it has generally inserted the more liberal principle that neutral ships shall make free goods. Since 1786 England had generally asserted her belligerent rights, until after the beginning of the Crimean war, by a common declaration with her ally France, promulgated in April, 1854, she announced that for the present she "waived her right of seizing enemy property laden on board neutral vessels, unless it were contraband of war." At the conclusion of the war England gave a more formal assent to the principle which she had so long opposed; for the declaration which was signed at the congress of Paris in 1856 by the plenipotentiaries of all the great powers, contained the provision that the neutral flag shall cover enemy goods, with the exception of those contraband of war, and it may be supposed has fixed the maxim in the law of nations. The rule usually coupled with that just referred to, though the two have really no connection, namely, that neutral goods, except contraband, are not liable to capture though laden in enemy ships, is also included in the declaration of the congress of Paris. It was formally rejected by France, but other nations have generally observed it.—Subject only to slight and reasonable restrictions, the neutral may carry on its commerce with the hostile powers. But plainly it must not furnish either with war supplies, nor indeed with any material which can directly contribute to the prosecution of hostilities. In the familiar phrase of the international law, its ships must not carry contraband. Further, they must neither break blockades, nor carry despatches for either party, nor in any other mode render direct assistance in the war. Finally, neutral ships must be always ready to prove themselves that which they profess to be, and must therefore be provided with papers sufficient to prove their nationality, and must submit to a reasonable exercise of the right

of visitation. It is not possible to define contraband specifically, that is, to declare what particular articles will be so regarded in time of war. There can be no doubt, however, respecting things which can be used only in war, or respecting materials which are peculiarly fitted by their nature for warlike uses. On the other hand, things which cannot be employed in war are, it is equally certain, not contraband. But it is difficult to determine the character of articles which are *ancipitis usus*, of a double or indifferent nature, and serviceable as well in peace as in war, such as money, provisions, ships and materials for ships, and naval stores. The decision will always be influenced by many considerations, as by the state and nature of the war, or by the highly probable destination of goods to a military use. Thus provisions, which *prima facie* are not contraband, will certainly be declared so when they are destined to a besieged town or blockaded port. The character of the port to which goods are bound may also be of consequence: whether, that is to say, it be a port of merely naval equipment, or one of general commerce. The changes which science has made in the needs and modes of warfare are also to be regarded, as well as the consideration whether the goods alleged to be contraband are or are not the produce of the country which exports them. Carrying official communications for a belligerent upon the public affairs of his state is a flagrant violation of neutrality. But to carry despatches from the enemy to his ambassador or consul in a neutral country is, generally speaking, no ground for condemnation, for the legal presumption is that the communication has reference to the commercial relations of the belligerent and the neutral. In the case of the Trent, in 1861, a naval officer of the United States asserted the right to seize on a neutral ship the ambassadors of the enemy proceeding to the courts to which they were accredited; but the right was denied by Great Britain, and the government disavowed the act. It seems to be the better opinion that the contraband character of the ship or goods terminates with that passage in which the forbidden trade is intended or done, and does not affect the whole voyage. The owner of the contraband loses all, even the innocent goods which he has laden in the ship. Other shippers forfeit nothing. This doctrine of contraband implies rather necessarily the belligerent's right to search neutral ships for such articles as may contribute to the comfort and strength of the enemy. The law of nations has been in this respect that in time of war search may be made for contraband and for enemy's goods. The late modification of the former practice, by which, as we have already seen, the goods of the enemy in neutral ships are now exempted from seizure, must tend, it would seem, to reduce the application of the law of search to the case of contraband alone. Some powers have de-

feated or hoped to defeat the right of search for contraband goods by forbidding their subjects to carry them; and sometimes treaties have provided that, in the case of ships under convoy, the declaration of the commander should suffice to exempt the ships in his charge from search.—A further restriction in force on the commerce of the neutral consists in his incapacity to trade to blockaded ports. To constitute a violation of blockade there must be first an actual blockade by a force sufficient to maintain the same; then there must have been proper notification of it; with these must concur some act of violation, either by going in or coming out with a cargo laden after the commencement of the blockade or an attempt so to do. Sir William Scott once held that a temporary absence of the blockading squadron, from being driven off by a storm or other accident, did not suspend the operation of the blockade. The French publicists controvert this doctrine, as unwarranted by the general principles of international law. But the law as Sir William Scott declared it is probably at present the law of England. The English and French declarations of 1854, however, speak of "effective blockades, which may be established with adequate forces." Some exception has been taken in the United States to the rule which forbids the departure of a vessel laden after the blockade was known. In a communication to Mr. Buchanan, American minister in London, in 1854, Mr. Marcy urges that, having visited the port in the common freedom of trade, the neutral vessel ought to be allowed to depart with a cargo, without regard to the time when it was received on board. This relaxation of the law of blockade will be hardly yet admitted in the general practice of nations; but, especially in our treaties with the Central and South American republics, it has assumed the form of familiar stipulation.—The principles of the international law of neutrality assume a peculiar significance in the law of marine insurance. In marine policies the ownership of the property is usually the subject of express warranty, and underwriters are thus informed of its liability to or freedom from war risks. The neutrality itself may be sometimes expressly warranted. In these cases the warranty is construed to mean, first, that the ship or cargo is actually owned by citizens of a country not at war when the risk begins, and secondly, that with the property there shall go all those usual documents and precautions which prove the neutrality and protect it from belligerent risks. The bill of sale of the ship, the sea letter or customary certificate of nationality, the register of the vessel, the charter party, shipping papers, the log book, and in general all the documents which usually state the national character, and especially the flag, must conform to the warranted neutrality of the ship. The law holds, too, that if a vessel exhibit only false papers when she is captured, there is a breach of the warranty, though she

have on board the proper papers of her nation, and have the right to carry false papers, because she must not only have the proper documents, but must use them at a proper time and in a proper way. Yet it seems that simulated or false papers may not only be carried when leave is expressly given, but when a usage exists to carry them, which is or should be known to the insurer. The warranty of the neutrality of a ship is broken if a belligerent own any part of it. In regard to goods the rule is different, and the warranty is held to extend only to the interest of the insured, and is not broken by the fact that a part of the cargo not insured is not neutral. But when the interest insured covers the whole cargo, the law will regard the real ownership; and therefore property held by a neutral by a legal title indeed, but for the benefit of and in trust for a belligerent, is belligerent property. If neutral goods are shipped in time of peace to a consignee who has not ordered them, so that the property would not vest in him till the goods were received, in case of capture they are considered as the property of the consignor. But if they are shipped by a neutral after the war begins, and under a contract made during peace but in contemplation of war, and to be at the risk of the sendee until delivery, they are put on the same footing as if the contract were made during war. If a subject of a belligerent power ship goods to a neutral which have not been ordered by him, so that the belligerent retains control over them, they are considered as his property. The mere right of the belligerent seller to stop goods *in transitu* on the insolvency of the vendee is not such an interest as would make the goods belligerent. The warranty of neutrality requires such trade, conduct, and course of transaction as shall be in conformity and adaptation to this warranty. Therefore, if the neutral interests or property are indistinguishably mixed up with belligerent interests or property, they become themselves liable to all the incidents and effects of a belligerent character. So resistance of a search when rightfully demanded, an attempt at rescue, seeking belligerent protection or receiving it, are all breaches of the warranty of neutrality, because they are belligerent in character. It is a sufficient compliance with the warranty, that a vessel is neutral according to the law of nations; and for a condemnation for breach of ordinances which are contrary to that law, the underwriters are still liable.

NEUVILLE, Alphonse de. See supplement.

NEUVILLE, Hyde de. See HYDE DE NEUVILLE.

NEUWIED, a town of Rhenish Prussia, on the right bank of the Rhine, 6 m. N. W. of Coblenz; pop. in 1872, 8,664, chiefly Protestants. There are about 400 Moravians, whose extensive establishments have given to Neuwied its chief celebrity. It dates from the 17th century, and by the liberality of its princes industrious persons of different religious creeds were attracted to the place, and established

manufactures of wool and cotton which have given to it its present prosperity. The palace possesses a museum of natural history, and a collection of Roman antiquities, chiefly from the buried Roman town of Victoria discovered in this vicinity in 1791.—The mediatized princes of Neuwied (or Wied, also Wied-Neuwied) are of very ancient origin, and among them have been several eminent men. Prince HERMANN (1814-'64) was distinguished as a soldier and as the anonymous author of philosophical works. His son, Prince WILLIAM (born in 1845), the present head of the house, is a brother of the princess Elizabeth, who became in 1869 the wife of Charles I. of Roumania, and he married in 1871 the Dutch princess Mary. An uncle of Prince Hermann was the celebrated traveller Prince MAXIMILIAN (1782-1867). He served in the Prussian army, but after having risen to the rank of major general left the service, and in 1815-'17 travelled in the interior of Brazil, exploring the dense forests of Bahia and Espirito Santo. He devoted special attention to zoölogy and ethnography, and was the first European to give any definite information respecting the Botocudos. In 1832-'4 he travelled in the United States, visiting its remote western regions. He published *Reise nach Brasilien* (2 vols., Frankfurt, 1819-'20), *Abbildungen zur Naturgeschichte Brasiliens* (Weimar, 1823-'31), *Beiträge zur Naturgeschichte Brasiliens* (4 vols., 1824-'33), and *Reise durch Nordamerika*, with 81 plates (2 vols., Coblenz, 1838-'43; English version, London, 1843), which is valued for its magnificent illustrations and its contributions to American ethnography. His zoölogical collection, embracing some of the rarest specimens of the South America fauna, is now in the American museum of natural history, New York. A genus of palms has been named in his honor *Maximiliana*.

NEVA, a river of Russia, flowing from the S. W. extremity of Lake Ladoga, first S. W., then N. W., and ultimately through the city of St. Petersburg, discharging by many mouths into the gulf of Finland. Its entire course is not more than 40 m., but it is very wide, has an average depth of two to three fathoms, and is of great commercial importance. It is liable, particularly at the breaking up of the ice in April, to sudden inundations, often most disastrous to St. Petersburg, which is built on the islands formed by its branches.

NEVADA, one of the western states of the American Union, the 23d admitted under the constitution, situated between lat. 35° and 42° N., and lon. 114° and 120° W.; extreme length N. and S. in the east, 485 m., and on the W. boundary, 210 m.; greatest breadth, on the 39th parallel, 320 m., N. of which it contracts to about 310 m., and S. of which it contracts to a point; area (greater than that of any other state except Texas and California), 104,125 sq. m. It is bounded N. by Oregon and Idaho, E. by Utah and Arizona (from the latter of which



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it is partly separated by the Colorado river), and S. W. and W. by California. The state is divided into 14 counties, viz.: Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Nye, Ormsby, Storey, Washoe, and White Pine. The principal cities and towns are Virginia (pop. in 1870, 7,048), Gold Hill (4,311), Hamilton (3,913), Carson City (the capital of the state 3,042), Treasure (1,920), Austin (1,324), Elko (1,160), Pioche City (1,144), Reno (1,035), Dayton (918), and Silver City (879). The population, exclusive of tribal Indians, in 1860 was 6,857; in 1870, 42,491, of whom 38,959 were whites, 357 colored, 3,152 Chinese, and 23 Indians; 32,379 were males and 10,112 females; 23,690 natives and 18,801 foreigners. There were 9,880 families, with an average of 4·3 persons to each, and 12,990 dwellings, with an average of 3·27 to each. The number of male citizens of the United States 21 years old and upward residing in the state was 18,652. Nevada has fewer inhab-

was between 4,000 and 5,000, viz.: Pah-Utes, 800; Pi-Utes in the S. part of the state, 1,031; Pi-Utes (1,000), living partly in W. Nevada and partly in N. E. California; Western Shoshones (1,945) and Goshop Utes (460), living partly in central and E. Nevada, and partly in Oregon, Idaho, and Utah. The Pah-Utes have two reservations of 320,000 acres each, including Walker lake and Pyramid lake respectively. The southern band of Pi-Utes belongs on a reservation of 3,900 sq. m. in the S. E. part of the state, but only about 500 have been removed to it. The tribes of Nevada are not hostile, and many of their members are engaged in agriculture.—With the exception of the S. E. corner, which belongs to the basin of the Colorado river, and a small portion in the N. E. drained by the Owyhee and other tributaries of the Snake, Nevada forms part of the elevated region lying between the Wahsatch and Sierra Nevada mountains, and known as the Great Basin. The general surface is a table land, with an altitude of 4,500 ft. above the sea, traversed with great uniformity by nearly parallel ranges of mountains rising from 1,000 to 8,000 ft. higher. These ranges for the most part have a N. and S. direction, and are separated by valleys from 5 to 20 m. wide, the bases of the mountains having also about the same width. The mountains are frequently intersected by ravines, which form easy passes, and in some places are broken into confused and detached masses. The valleys sometimes extend more than 100 m., uninterrupted except by an occasional butte or projecting spur, and frequently, where the mountains disappear or contract, unite with other valleys, or expand into broad plains or basins, some of which are unobstructed, while others are dotted with buttes or covered with groups of rugged hills. The Sierra Nevada mountains, which form a portion of the W. boundary, reach an elevation of from 7,000 to 13,000 ft. above the sea.—The rivers of Nevada are small and unnavigable, and with the exception of the Owyhee and other streams that flow N. into Oregon and Idaho, and join the Snake, a branch of the Columbia, and the Rio Virgen and other small tributaries of the Colorado in the S. E., have no outlet to the ocean. The Colorado is navigable along the S. E. border to Callville. Some of the streams terminate in beautiful lakes; others disappear in "sinks" or sloughs. Many of them in their course sink in the porous soil, and reappear a few miles further on. There are many small mountain streams that lose themselves soon after reaching the plains. The Humboldt, the longest river, rises in the N. E. corner of the state, flows generally W. for upward of 200 m., when it receives the Little Humboldt from the north, bends S. W., and after a further course of nearly 100 m. terminates in Humboldt lake or sink. Walker river is formed in the S. W. part of the state by the junction of the E. and W. forks, which rise in the Sierra Nevada in California, and flows first N. E. and then S.



State Seal of Nevada.

itants than any other state. Of the native population, 3,356 were born in the state, 3,265 in New York, 2,390 in California, 1,858 in Ohio, 1,488 in Pennsylvania, 1,144 in Illinois, 1,083 in Maine, 1,053 in Missouri, 997 in Massachusetts, and 958 in Utah. Of the foreigners, 5,035 were natives of Ireland, 2,549 of England, 2,365 of British America, and 2,181 of Germany. There were 727 persons 10 years old and upward unable to read, and 872, including 198 Chinese, unable to write. Of the total number of persons 10 years old and upward returned as engaged in all occupations (26,911), 2,070 were employed in agriculture, including 555 laborers and 1,242 farmers and planters; in professional and personal services, 7,431, including 35 clergymen, 3,939 laborers, 166 lawyers, 110 physicians and surgeons, and 61 teachers; in trade and transportation, 3,621; and in manufactures and mechanical and mining industries, 13,789, of whom 8,241 were miners. The number of tribal Indians in Nevada in 1874, according to the report of the United States commissioner of Indian affairs,

E., and terminates in Walker lake in Esmeralda co., after a course of 45 m. The Truckee river flows from Lake Tahoe on the California border, W. of Carson City, in an irregular N. E. course of about 60 m., and empties into Pyramid lake. Carson river rises in the Sierra Nevada S. of Lake Tahoe, and flows N. E. to the Carson lakes in Churchill co. Reese river, in the central portion of the state, flows N. toward the Humboldt, but usually sinks before reaching it. Quin's river and King's river are in the northwest. In the south is the Amargosa river, which disappears in Death valley, California. About a third of Lake Tahoe is in Nevada. It has a depth of 1,500 ft., is 21 m. long by 10 m. wide, and, though more than 6,000 ft. above the sea, never freezes, the temperature of the water varying little from 57° throughout the year. Pyramid lake, in the E. part of Washoe co., 33 m. long and 14 m. wide, and Walker lake, about 30 m. long and 6 or 7 m. wide, have considerable depth, and as well as Lake Tahoe contain pure water and abound in trout and other fish. The water of the rivers, particularly of the mountain streams, is generally fresh and pure, and well stocked with fish. In some of the rivers, however, as the Humboldt, particularly in low stages of water, and in most of the smaller and shallower lakes, it is brackish and alkaline. Lower Carson lake, 12 m. in diameter, and Humboldt lake, somewhat smaller, are shallow, being in fact mere sinks, and are connected with each other at high stages of water by small streams or "sloughs." Other lakes or sinks are Ruby, Franklin, and Snow Water, in the E. part of the state, and Winnemucca lake, E. of Pyramid, which occasionally discharges into it its surplus waters. Many of the plains and valleys, being nearly level or slightly basin-shaped, and consisting of a stiff clay nearly impervious to water, are readily converted in the wet season into shallow lakes, rarely more than a foot or two deep, which derive the name of "mud lakes" from their generally miry and impassable condition. Some of them exist only for a few days, others last until the dry season comes on, and a few continue throughout the year. When dry, their beds become very hard, and are often covered with an incrustation of alkaline matter, in which condition they are known as alkaline flats. The most extensive mud lakes occur in the N. W., central, and S. portions of the state, where some of them cover more than 100 sq. m.—Both cold and hot springs abound in many parts, some being in a state of ebullition, others quiet; some pellucid and pure, others impregnated with a great variety of mineral substances. In some places they occur singly, and in others in groups. They range in temperature from 50° to 204°, the latter being about the boiling point of water in this region; in diameter, from 1 to 100 ft.; and in depth, from 3 or 4 to 150 ft. They are generally circular in form. The mineral and warm springs are commonly situated on mounds formed of

the silicious or calcareous particles brought up by their waters, sometimes covering several acres and 50 or 60 ft. high. Hot and cold springs are often found in close proximity to each other. The most common mineral substances found in the waters are chlorides of sodium and magnesium, with soda in various forms, and a small percentage of lime, sulphur, silica, and iron. Some of these springs possess curative properties. The most remarkable group of warm springs in the state is that known as the Steamboat springs in Washoe co., about 16 m. N. of Carson City and 4 m. E. of the Sierra Nevada. They occupy a rocky mound about $\frac{1}{2}$ m. long and $\frac{1}{4}$ m. wide, rising 50 or 60 ft. above the valley. The mound is rent longitudinally by a number of irregular fissures from six inches to a foot in width, through which at intervals of a few minutes volumes of hot water gurgle up, and after hissing and foaming for a minute or two subside. From some of the fissures small jets of steam constantly escape, accompanied by gas. Besides the fissures there are pools filled with hot water, one of which, occupying a basin 3 ft. in diameter and 1 ft. high, rises and falls every six minutes. The temperature of these springs varies greatly, that of the hottest being 204°. The air here smells of sulphur, and the ground in the vicinity is impregnated in places with that mineral. The springs emit a sound like that of a boiling caldron, and when first discovered are said to have given forth a puffing noise like that of a steamboat, whence their name. Some of the cold springs, particularly in the E. and central parts of the state, are scarcely less remarkable for their size, depth, and volume of water discharged. The salt deposits of Nevada are extensive and important. The largest supply at present is obtained from the Sand Springs salt marsh, E. of the Carson sink in Churchill co., which contains a bed of crystallized salt of unknown thickness below several layers of clay. It is obtained only from the surface, which is damp and marshy, and in some places covered with a few inches of water, and is coated with a crystallized incrustation of salt two or three inches thick. When removed it immediately begins to reform, and a fresh supply may be gathered about once a month. About 40 m. N. of the Sand Springs marsh, in the same county, is a similar deposit, from which a considerable quantity is obtained. It consists of an incrustation of salt an inch or two thick, overlying a stratum of blue clay 18 in. thick, filled with cubical crystals of salt, and resting upon an unknown depth of pure salt. The most extensive salt field of the state is in Silver Peak district, Esmeralda co., covering an area of 40 or 50 sq. m., much of which is coated with a thick incrustation of pure salt underlaid by seams of clay and a crystallized mass of salt of unknown thickness. In Smoky valley, Nye co., 2 m. from the line of Lander co. and 32 m. from Austin, is a salt marsh, upon which an incrustation of salt

forms in spring, which is gathered. Salt valley, 30 m. E. of Humboldt lake, is remarkable for its immense salt bed. In Lincoln co., in the S. E. part of the state, W. of the Rio Virgen, are the "salt bluffs," 500 ft. above the level of the valley, consisting of a mass of pure rock salt, nearly 2 m. long and $1\frac{1}{2}$ m. wide, of unknown depth, covered with a coating of sand and earth from a foot to several feet thick. The waters of the Eagle salt marsh, in Churchill co., 3 m. from Hot Springs on the Central Pacific railroad, contain 30 per cent. of salt, which is obtained by evaporation. There is also a salt marsh in Eureka co., 43 m. N. of the town of that name, where salt is made by evaporation. Borax is also an important product of the state. It is manufactured in Churchill co. near Hot Springs, and E. of the sink of the Carson, from boracic acid and the borates of lime and soda, which occur in the alkali flats. The richest and most extensive deposits of the salts of borax (containing 31 per cent. of that substance) are found near Columbus, in Esmeralda co., and large quantities are here manufactured. The borates of lime and soda occur between two layers of salt, the lower one of which is itself overlaid by a bed of sulphate of soda (Glauber's salt). Soda is obtained from a small lake 25 m. from Wadsworth, on the Central Pacific railroad, in the central part of the state, forming on the shore in a nearly pure state as fast as removed. —The general geological character of Nevada is volcanic. The mountain ranges are composed, first, of crumpled and uplifted strata, from the late Jurassic down to the azoic period; secondly, of ancient eruptive rocks, which accompany the Jurassic upheaval; and thirdly, of modern eruptive rocks belonging to the volcanic family, and ranging in date probably from as early as the late miocene up to the glacial period. The valleys are filled with quaternary detritus, the result of erosion from the early cretaceous period down to the present time. Syenite, granite, porphyry, slate, and quartzite prevail in some of the mountain ranges, while many of them are of limestone, mingled with calcareous spar; this either rests upon or alternates with hard and compact grits and quartzite. In many of the cañons are found boulders of serpentine, conglomerate, talcose slate, fine gray granite, coarse red, crystalline white, and metamorphic sandstone, gypsum, pebbles of alabaster, and various kinds of limestone. Marble of different textures is found in various localities. The volcanic action is indicated by the presence of lava, obsidian, scoria, and sulphur. In the mountains of the Colorado basin limestone predominates, besides which are found granite, syenite, serpentine, arenaceous and chloritic slates, all scored and marked by dikes and overflows of trachytic lavas and basaltic trap rock. Where granite and gneiss (which are the prevailing rock formations of the Sierra Nevada) occur here, they are for the most part

hidden by porphyries, greenstone, amygdaloid, basalt, obsidian, and other rocks of igneous origin. Traces of coal of different varieties, but generally of inferior quality, have been found in various localities, but it has not been successfully mined, and is not known to exist in valuable quantities. Seams of coal of superior quality have recently been discovered in the Pancake mountains in White Pine co., 15 m. from Hamilton, but to what extent they can be made available is yet undetermined. Kaolin and other clays, useful in the manufacture of pottery and fire brick, mineral pigments, nitre, and alum are found. Copper occurs in Churchill co., E. of the lower Carson sink; in Battle Mountain and Bolivia districts, Humboldt co., where several mines are in operation; and between the forks of Walker river. Rich lead and copper ores exist in Washoe co., and copper and iron are found in Robinson district; White Pine co., 45 m. E. of Hamilton. Veins of antimony are worked in Battle Mountain district. These metals, which are also found in other parts of the state, and cinabar, manganese, plumbago, magnesia, platinum, zinc, tin, nickel, cobalt, and arsenic, generally occur in connection with the precious metals. Gold and silver are commonly found associated with each other, gold predominating in the Antelope district, Churchill co.; in Tuscarora district, on the head waters of the Owyhee river; in Gold Mountain district, Esmeralda co.; in Sacramento district, and in some of the mines of Sierra district, Humboldt co.; and in some other places. But the great wealth of Nevada is in its silver mines, which exist in nearly every section. The richest deposit of silver in the state, if not in the world, is the Comstock lode, on the E. side of Mt. Davidson, in Storey co., and partly under the towns of Virginia and Gold Hill. Its ores contain about one third in value of gold and two thirds of silver. The lode has been traced on the surface 27,000 ft., and has been actually explored for 19,000 ft., within which space the principal mines are situated. It has been opened to a depth of 2,000 ft. New deposits were discovered toward the close of 1874, which are believed to be of incalculable value. A tunnel, known as the Sutro tunnel, is in progress, designed to drain the mines and otherwise facilitate operations on the lode. It commences at a point $1\frac{1}{2}$ m. from Carson river and $3\frac{1}{2}$ m. below Dayton, and runs N. W. to the Savage mine, a distance of 20,178 ft., where its depth will be 1,922 ft. At the close of 1874 it had reached a distance of 8,250 ft., and was progressing at the rate of 7 ft. a day. Next to those of the Comstock lode, the most productive silver mines are in the region near Eureka, in the E. central portion of the state, and in the Ely district, near Pioche, Lincoln co., in the S. E. The White Pine region in the E. part of the state, which after the discovery of the mines in 1868 was the scene of great excitement, now yields comparatively small

returns. The bullion product of the state since the opening of the mines, according to R. W. Raymond, United States commissioner of mining statistics, has been as follows:

YEARS.	ENTIRE PRODUCT OF THE STATE.			Separate product of the Comstock lode.
	Gold.	Silver.	Total.	
1861 ..	\$600,000	\$1,400,000	\$2,000,000	\$1,500,000
1862 ..	2,500,000	4,500,000	7,000,000	6,000,000
1863 ..	4,000,000	8,500,000	12,500,000	12,000,000
1864 ..	5,000,000	11,000,000	16,000,000	14,500,000
1865 ..	4,750,000	11,250,000	16,000,000	14,500,000
1866 ..	4,000,000	9,000,000	13,000,000	12,000,000
1867 ..	4,500,000	11,500,000	16,000,000	13,600,000
1868 ..	2,800,000	10,500,000	13,300,000	8,500,000
1869 ..	2,500,000	11,500,000	14,000,000	7,550,000
1870 ..	2,800,000	13,200,000	16,000,000	8,500,000
1871 ..	3,750,000	18,700,000	22,450,000	11,350,000
1872 ..	6,000,000	19,550,000	25,550,000	14,000,000
1873 ..	10,000,000	25,250,000	35,250,000	22,000,000
1874 ..	10,000,000	25,500,000	35,500,000	23,000,000
Aggregate.	\$63,230,000	\$181,350,000	\$244,580,000	\$169,000,000

The value of the bullion product of Nevada since 1871 has exceeded that of California. The United States census of 1870 (admitted to be incomplete) returns 139 mines, having 44 steam engines of 2,780 horse power and 2 water wheels of 50 horse power; hands employed, 2,866 (809 above and 2,057 below ground); capital invested, \$32,253,400; wages paid during the year, \$2,900,872; value of materials used, \$1,636,865; of products, \$11,166,452. Of the mines, 91 were quartz mines of silver, 46 quartz mines of gold and silver, 1 copper, and 1 lead. The number of quartz-crushing mills in 1872, according to the report of the state mineralogist, was 162; number of smelting furnaces, 16; number of stamps, 1,904; daily capacity in tons, 5,183. These numbers include those idle as well as those in operation. (See SILVER.) The amount of bullion from Nevada deposited at the United States mints and assay offices to June 30, 1874, was \$17,044,166 42, of which \$13,492,414 79 was silver and \$3,551,751 63 gold. A mint was established at Carson City in 1870, at which the deposits of gold from all sources to Dec. 31, 1874, amounted to \$14,093,487 86; of silver, to \$14,109,017 19; total, \$28,202,505 05. —The climate is in general comparatively mild, the summers not warmer than E. of the Rocky mountains, and the winters less severe than in New England, little snow falling except on the mountains. In the north and interior the average summer temperature at noon is 90°, falling to 70° at night. In the severest weather in winter the thermometer ranges from 0° to —15° or —20°. In the southeast the winters are milder, frosts being rare in the valleys, and the summers hotter; the thermometer in May and June ranges from 95° to 115°. Little rain falls, artificial irrigation being necessary to agriculture, and thunder and lightning, though more frequent than in California, are rare. In the north and west the wet season lasts from January to May, when there are slight rain-falls, while occasional showers occur in the

south and east during the summer months. Cloud bursts, which precipitate large quantities of water, and often do much damage, are not infrequent; and sand storms and sand clouds or pillars, the latter formed after the manner of water spouts, are common on the plains, where also mirage is of frequent occurrence. The air is generally pure and invigorating.—The general appearance of Nevada is arid and barren. The E. slopes of the Sierra Nevada within the state are heavily timbered with pine, spruce, and fir. These forests constitute the only lumber region of the state, and are fast disappearing. The other mountain ranges are bare or thinly wooded with dwarf trees, principally cedar and *piñon* or nut pine, with mountain mahogany, fir, and juniper in some localities. The White Pine mountains, in the county of the same name in the E. part of the state, contain some good-sized white pine and white fir, and the yellow pine on the E. slope of the Spring mountains in the Colorado basin attains a considerable size. The open plains and narrow valleys are destitute of wood, except where traversed by considerable streams, along which occur scattered cottonwoods, copses of willows, birch, wild cherry, &c., mostly of small size and little value. With these are often found rose, currant, gooseberry, and other bushes, and varieties of wild vines. The plains generally produce only sand grass and sage (*artemisia*), while the watered valleys contain meadow land, and most of the mountain ranges are more or less clothed with bunch grass. But in some sections valleys, plains, and mountains are equally destitute of wood, and but scantily supplied with grass and water, the latter where it occurs being often so impregnated with mineral substances as to be unwholesome, or so warm as to be unfit for immediate use. Some of the more extended plains are so barren as to receive the popular designation of "deserts," among which may be mentioned those adjacent to the sinks of the Humboldt and Carson, the vicinity of the mud lakes in the northwest, and the region stretching from the Great Salt valley of Churchill co. through the centre of the state, and spreading out into the sandy wastes that surround Death valley in California. Most of the Colorado basin is a sandy desert yielding only sage brush, greasewood, and cacti. The mezquite bush is also found in this part of the state. Large portions of Nevada are well adapted to grazing, stock in most parts of the state requiring neither prepared food nor shelter in winter. The bunch grass of the mountains furnishes food in summer, and in winter the herds descend to the plains and fatten on the sand grass and white sage. The sand grass grows in bunches to the height of a foot, and bears an abundance of small black seeds that are very nutritious; the white sage is eagerly sought for after it has been touched by the frost. Much of the most barren land of the state possesses the elements of fertility, and with irrigation would be productive. The

general character of the soil and contour of the surface induce the belief that artesian wells may be successfully employed for this purpose. At present agriculture is carried on only in the fertile bottoms of the principal rivers, and at points where the mountain streams afford the means of irrigation. The principal agricultural tracts are the valleys of the Truckee, Humboldt (though the soil here is somewhat alkaline), Quin's, King's (25 m. N. W. of the last), Reese, Walker, Carson, and Owyhee rivers; Paradise valley, watered by the Little Humboldt; and Pahrnegat valley, in the S. E. part of the state. Some of the valleys not intersected by rivers are susceptible of cultivation. Here the mountain streams sink upon reaching the valleys, and make their way underground toward the centre, where, meeting with obstructions or gathering in natural basins, they saturate the earth and render it productive. Around some of the lakes or sinks and along some of the streams occur patches of "tulé land," or ground overflowed at high water and covered with a large species of bulrush. When drained these tracts form excellent meadows and may be cultivated. The chief crops are wheat, barley, oats, hay, potatoes, and other vegetables. In most parts of the state the nights are too cool for Indian corn. In some places apple, pear, peach, and plum trees, and the grape vine have been set out, and have borne well. Forest and shade trees have also been planted at a few points. In the valley of the Muddy, a tributary of the Rio Virgen, and at other points in the Colorado basin, the Mormons a few years since had settlements, where they raised cotton, sorghum, tobacco, melons, squashes, beans, Indian corn and the smaller grains, oranges, lemons, peaches, grapes, apples, pears, apricots, figs, pomegranates, olives, &c. Two crops a year may be raised here, wheat, barley, and oats being harvested in June, after which corn, beans, and garden vegetables are planted. The principal wild animals are the hare, coyote, and wolf. The beaver, otter, marten, fox, fisher, and other fur-bearing animals are now rarely found. The sage hen is common, and geese, ducks, cranes, and pelicans are numerous around the lakes and sinks at certain seasons of the year.—The number of acres of improved land in farms in 1870 was 92,644; number of farms, 1,036, of which 116 contained less than 10 acres each, 138 from 10 to 20, 190 from 20 to 50, 150 from 50 to 100, 242 from 100 to 500, 197 from 500 to 1,000, and 3 more than 1,000; cash value of farms, \$1,485,505; of farming implements and machinery, \$163,718; amount of wages paid during the year, including the value of board, \$438,350; estimated value of all farm productions, including betterments and additions to stock, \$1,659,718; value of orchard products, \$900; of produce of market gardens, \$31,235; of forest products, \$36,700; of home manufactures, \$2,329; of animals slaughtered or sold for slaughter, \$104,471; of live stock, \$1,445,449.

The productions were 147,987 bushels of spring wheat, 80,879 of winter wheat, 310 of rye, 9,660 of Indian corn, 55,916 of oats, 295,452 of barley, 985 of buckwheat, 414 of peas and beans, 129,249 of Irish potatoes, 7 of clover seed, 64 of grass seed, 25 lbs. of tobacco, 27,029 of wool, 110,880 of butter, 711 gallons of wine, 63,850 of milk sold, 3,651 of sorghum molasses, 106 bales of cotton, and 33,855 tons of hay. The live stock consisted of 7,520 horses, 990 mules and asses, 6,174 milch cows, 2,443 working oxen, 22,899 other cattle, 11,018 sheep, and 3,295 swine. There were also 6,880 horses and 9,453 cattle not on farms. The number of manufacturing establishments was 330, having 120 steam engines of 6,007 horse power and 34 water wheels of 2,538 horse power; number of hands employed, 2,859; capital invested, \$5,127,790; wages paid during the year, \$2,498,473; value of materials used, \$10,315,984; of products, \$15,870,539. The principal items are shown in the following table:

INDUSTRIES.	Number of establishments.	Capital invested.	Value of products.
Blacksmithing.....	33	\$31,000	\$141,800
Boots and shoes.....	22	17,300	76,770
Carpentering and building	24	13,000	96,400
Carriages and wagons.....	3	21,000	60,000
Clothing.....	7	9,600	42,600
Confectionery.....	3	9,000	40,500
Flouring and grist mill products	7	47,200	97,920
Furniture.....	8	23,900	39,600
Gold and silver, reduced and refined.....	1	50,000	260,000
Iron castings.....	5	101,000	641,250
Lead pigs.....	9	438,000	894,600
Liquors, malt.....	17	83,300	184,980
Lumber, sawed.....	18	198,500	432,500
Machinery.....	6	57,000	841,500
Mineral and soda waters.....	3	11,000	36,000
Quartz, milled.....	93	3,869,500	12,119,719
Saddlery and harness.....	9	24,400	60,200
Sash, doors, and blinds.....	2	21,000	55,000
Tin, copper, and sheet-iron ware	12	43,500	99,300
Wheelwrighting.....	12	11,550	70,500

The number of steam engines employed in the quartz mills was 84, with 5,006 horse power; water wheels, 22, with 2,168 horse power; hands employed, 1,637; wages paid during the year, \$1,693,135; value of materials used, \$8,527,843. There are 527 m. of railroad in the state, viz.: Central Pacific, which crosses it from E. to W., connecting with San Francisco and the Union Pacific railroad, 454 m.; Virginia and Truckee, from Reno on the Central Pacific *via* Carson City to Virginia, 52 m., with a branch of 1 m.; and the Pioche and Bullionville, between those two points in Lincoln co., 20 m. The Eureka and Palisade railroad, from Palisade on the Central Pacific to Eureka, 82 m., is to be completed in the summer of 1875. There is one bank of deposit, incorporated under state law, with a capital of \$100,000.—The executive power is vested in a governor (salary \$6,000), lieutenant governor (*ex officio* adjutant general and state librarian), secretary of state, treasurer, comptroller, surveyor general and land register, and attorney

general (salary \$3,600 each), elected for four years. A superintendent of public instruction (salary \$2,000) and a state mineralogist (\$3,600) are elected for the same term. The legislative authority is vested in a senate of 25 and an assembly of 50 members, chosen by districts, senators for four years (half retiring biennially) and assemblymen for two years. Members of the legislature receive \$8 a day while in attendance and 40 cents a mile in going to and returning from the seat of government. Regular sessions cannot exceed 60 days, and are held biennially, commencing on the first Monday in January of odd years. The judicial power is vested in a supreme court, district courts, and justices of the peace. The supreme court consists of a chief and two associate justices (salary \$7,000 each), elected for six years, one retiring every two years. The state is divided into nine judicial districts, in each of which a district judge is elected for four years. Justices of the peace are elected in the various cities and townships for two years. In civil cases that require a jury three fourths may render a verdict. The right of suffrage is conferred by the constitution upon all white male citizens of the United States of sound mind and not convicts, who have attained the age of 21 years, and have actually resided in the state six months and in the district or county 30 days next preceding the election. Under the federal constitution colored citizens have the right to vote. General elections occur on the Tuesday next after the first Monday of November of even years. Amendments to the constitution must be proposed by two successive legislatures and adopted by the people. A convention to revise the constitution may be called by a two-thirds vote of each house of the legislature, ratified by a vote of the people. The circulation of bank notes or paper of any kind as money, except federal currency and notes of banks authorized by congress, is prohibited. In the absence of special agreement the rate of interest is 10 per cent., but any rate may be stipulated for in writing. Nevada is entitled to two senators and one representative in congress, and therefore has three votes in the electoral college.—The assessed value of real estate in 1870, according to the United States census, was \$14,594,722; of personal property, \$11,146,251; total assessed value, \$25,740,973; total true value of property, \$31,134,012. The total taxation was \$820,308, of which \$298,411 was state, \$498,062 county, and \$23,835 town, city, &c.; total public debt, \$1,986,093, of which \$642,894 was state, \$987,423 county, and \$355,776 town, city, &c. The state debt includes bonds to the amount of \$58,000 held by the school fund; the amount of the interest and sinking fund was \$86,121. The assessed value of property for 1874, according to the report of the comptroller, was: real estate, \$14,125,578 01; personal estate, \$12,504,701 21; total, \$26,630,279 22; state tax thereon

(\$1 25 on \$100), \$332,878 49; county tax, \$562,555 46; total taxation on property, \$895,433 95; besides which a state tax is levied on the net proceeds of mines, at the same rate as the state tax on property. A poll tax of \$4, one half for state and one half for county purposes, is also levied on each male resident between 21 and 60 years of age. The receipts into the state treasury during 1874 were \$570,277, viz.: from property tax, \$275,369 65; tax on proceeds of mines, \$163,114 28; state poll tax, \$25,196 20; gaming licenses, \$16,756 23; fines, \$2,562 40; state prison, \$21,701 60; sales of state lands, \$42,480 42; the rest from miscellaneous sources. The total expenditures during the same period amounted to \$641,856 31, viz.: for salaries and contingencies of executive department, \$61,012 27; salaries and contingencies of judicial department, \$25,876; state library, \$2,601 78; support of state prison, including salaries of warden and deputy, \$64,090 27; charitable purposes, \$38,478 29, including \$12,121 28 for state orphans' home, \$25,429 36 for support of indigent insane, and \$927 65 of deaf mutes and blind; state capitol, \$15,464 40; support of schools, \$30,510 79; interest on state bonds, \$64,304 24; purchase of United States gold bonds for investment, \$271,783 77; construction of new prison at Reno, \$50,601 87; state university, \$1,479 38; miscellaneous purposes, \$15,652 55. The balance in the treasury on Dec. 31, 1874, was \$518,717 21 (\$489,177 07 coin and \$29,540 14 currency), viz.: belonging to the general fund, \$322,335 58; school funds, \$43,401 93; interest and sinking funds, \$67,437 57; university funds, \$30,316 10; various special funds, \$55,226 03. The state debt at the above date amounted to \$752,361 37, viz.: 10 per cent. bonds due April 1, 1881, \$160,000; 9½ per cent. bonds due March 1, 1882, \$120,000; 9½ per cent. bonds due March 1, 1887, \$380,000; accrued interest, \$19,833 32; outstanding warrants, \$73,528 05. The assets were as follows: state bonds belonging to school fund, \$104,000; United States bonds belonging to school fund, \$146,000; United States bonds belonging to sinking fund, \$100,000; United States bonds belonging to university fund, \$10,000; accrued interest, \$10,853 33; balance in treasury, \$518,717 21; total, \$889,570 54. According to the reports of the county auditors for 1874, the aggregate debt of the counties was \$1,296,208 48, of which \$1,026,183 14 was funded and \$270,025 34 floating; amount of cash in county treasuries, \$306,767 07; estimated value of property belonging to counties, \$444,175. The state institutions are the state prison, now near Carson City; the state orphans' home, in that city; and the state university, at Elko. New prison buildings are in course of construction near Reno. The indigent insane are supported by the state at a private institution in California, while the blind and deaf mutes are provided for at the California state institution.—The constitution requires the legislature to estab-

lish a uniform system of common schools, and also a state university to embrace departments of agriculture, mechanic arts, and mining. A common school is required to be maintained for at least six months of each year in each school district. The school law vests the general control of the schools in a state board of education consisting of the governor, surveyor general, and superintendent of public instruction; a county superintendent of public schools for each county, elected for two years; and a board of trustees of three or five members for each district, elected by classes for four years. By an act of 1873 all children between the ages of 8 and 14 years, unless otherwise educated, are required to attend the public schools at least 16 weeks in each school year, at least 8 weeks of which must be consecutive. The following statistics are for the year ending Aug. 31, 1874: number of children between 6 and 18 years of age, 6,315; number of school districts, 71; of schools, 108 (2 high, 12 grammar, 4 intermediate, 21 primary, 69 unclassified); of teachers, 115; pupils enrolled, 4,811; average daily attendance, 2,884; average duration of schools, $7\frac{1}{2}$ months; total receipts for school purposes, \$126,093 97, of which \$30,811 98 was derived from state apportionments, \$81,945 24 from county taxes, \$11,485 99 from district taxes, \$817 69 from rate bills, and \$1,533 07 from miscellaneous sources; total expenditure, \$124,301 64, of which \$83,548 88 was for teachers' wages, \$22,241 05 for sites, buildings, repairs, and furniture, and \$18,511 71 for other purposes; value of school property, \$121,011; amount of permanent school fund, \$250,000. The state university was established by an act of 1873, and the preparatory or academic department was opened in October, 1874. The legislature in 1875 appropriated \$20,000 for its support. An act was passed at the same session providing for an agricultural college, under the congressional land grant of 90,000 acres, for colleges of arts and mines, and for a normal school. According to the census of 1870, there were 314 libraries, with 158,040 volumes, of which 286 with 118,100 volumes were private. Of those not private, 1 was the state library with 20,000 volumes; 1 court and law, 250; 16 Sabbath school, 5,950; 2 church, 600; 8 circulating, 15,140. The number of newspapers was 12, issuing 2,572,000 copies a year, and having a circulation of 11,300; 5 were daily, 2 semi-weekly, and 5 weekly. The number of church organizations was 32 (5 Episcopal, 11 Methodist, 1 Mormon, 5 Presbyterian, and 10 Roman Catholic), having 19 edifices, with 8,000 sittings and property to the value of \$212,000.—The region within the limits of Nevada forms part of the Mexican cession of 1848. The territory of Nevada was created by act of congress of March 2, 1861, from a portion of Utah, and embraced the region bounded N. by the present boundary of the state, E. by the 116th meridian, S. by the 37th

parallel, and W. by California. A portion of California was included by the act within the limits of the territory, but the consent of that state to its transfer was refused. By the act of July 14, 1862, a further portion of Utah was added, extending the E. boundary to the 115th meridian. The act of March 21, 1864, enabled the inhabitants to form a state government, and, a constitution having been framed and ratified by the people, Nevada was declared a state by a proclamation of the president of Oct. 31 of that year. A third portion of Utah was added by the act of May 5, 1866, extending the E. boundary to the 114th meridian, and by the same act the portion of the state S. of the 37th parallel was added from Arizona. The first settlements within the present limits of the state were made by Mormons in Carson, Eagle, and Washoe valleys in the west, near the present towns of Genoa and Carson City, in 1848, and the two or three following years. Gold was discovered in 1849 in the same vicinity, near the site of the present town of Dayton, and attracted some miners; but at the time of the discovery of silver in 1859 the population did not exceed 1,000. From this period the growth of Nevada may be dated. Within two years the mines were fairly in operation, the number of inhabitants having risen to upward of 16,000 in August, 1861. The first discoveries embraced the Comstock lode. (See supplement.)

NEVADA. I. A S. W. county of Arkansas, formed since the census of 1870 from portions of Columbia and Ouachita counties, bounded N. by the Little Missouri river, a branch of the Washita, and drained by several tributaries of that stream and of Red river; area, 625 sq. m. The surface is rolling and generally well timbered. The valleys contain much productive soil. Capital, Mount Moriah. **II.** A N. E. county of California, bordering on Nevada, and drained by Middle and South Yuba rivers; area, 1,026 sq. m.; pop. in 1870, 19,134, of whom 2,627 were Chinese. The surface is generally mountainous, especially toward the east, which is traversed by the Sierra Nevada range. One half of the area is estimated to be occupied by mineral lands. Gold mining is the principal industry, and agriculture receives little attention, though there is much arable land, and timber is abundant. The county contains several of the richest and most productive quartz lodes in the state, and the placer diggings are not surpassed by any other. The number of mines in 1870 was 80, viz.: 25 hydraulic, 40 placer, and 15 quartz. The Central Pacific railroad passes along the S. border. The chief productions in 1870 were 5,548 bushels of potatoes, 10,183 gallons of wine, 50,741 lbs. of butter, and 4,804 tons of hay. There were 786 horses, 1,148 milch cows, 1,156 other cattle, 504 sheep, and 1,187 swine on farms; 1 manufactory of boots and shoes, 3 of iron castings, 2 of machinery, 4 of sash, doors, and blinds, 6 of tin, copper, and sheet-iron ware,

1 pork-packing establishment, 12 breweries, 1 flour mill, and 10 saw mills. Capital, Nevada.

NEVERS, a town of France, capital of the department of Nièvre, on the Loire, at the junction of the Nièvre, 180 m. S. E. of Paris; pop. in 1872, 22,276. Caesar mentions the town in his "Commentaries" under the name of Noviodunum. It was formerly the capital of the province of Nivernais. In the middle ages it was ruled by counts and afterward by dukes, and was annexed to the French crown in the 17th century. It is the seat of a bishop, and has a lyceum, an episcopal seminary, a theatre, and a picture gallery. The old city walls and towers still remain. The cathedral of St. Cyr is much dilapidated, but contains a famous flamboyant doorway and a remarkable spiral staircase. The palace of justice, formerly that of the dukes of Nevers, is a stately building, and the hôtel de ville contains a museum of Gallo-Roman antiquities and pottery. This industry employs more than 700 persons. The iron works are extensive, and there is a cannon foundry here for the navy.

NEVANSK, a town of Russia, in the government of Perm, near the source of the Neiva in the Ural mountains, 47 m. N. of Yekaterinburg; pop. about 20,000. It is the centre of one of the oldest and most important mining regions, in the midst of almost continuous forests. It contains a castle, built early in the 18th century by Prince Demidoff, with a fine tower which once served as a refinery for silver from the Altai. Excellent bar iron and lacquered ware are made.

NEVIN, John Williamson, an American clergyman, born in Franklin co., Pa., Feb. 20, 1803. He graduated at Union college in 1821, studied theology at Princeton, and continued there afterward as assistant teacher and wrote "Biblical Antiquities" (2 vols., 1828). He was licensed to preach in 1828. From 1829 to 1839 he was assistant teacher and professor of Hebrew and Biblical literature in the Presbyterian theological seminary at Allegheny City, and in 1833-'4 edited "The Friend," a weekly literary journal. In 1840 he removed to Mercersburg, and took charge of the theological seminary there; and in 1841 he became also president of Marshall college. In 1843 he published "The Anxious Bench," which was translated into German, and also a translation of Dr. Schaff's "Principle of Protestantism," with an introduction. In 1846 he published "The Mystical Presence;" in 1847, "The History and Genius of the Heidelberg Catechism;" in 1848, "Antichrist, or the Spirit of Sect and Schism." From January, 1849, to January, 1853, he edited the "Mercersburg Review." At the close of 1851 he resigned his situation as professor in the theological seminary, continuing to act as president of Marshall college until its removal to Lancaster in 1853. He was the originator and exponent of what is called the "Mercersburg system of theology," which arose on the occasion of some revival measures in 1843. It

endeavored to restore the Protestant sacramental faith of the 16th century, and opposed sects as a rejection of the actual incarnation of Christ in his church. The church is the body of Christ, and hence divine and an object of faith; its ministers hold a divine power by apostolic succession; and its sacraments are seals as well as signs of grace. Baptism is for the remission of sins; and Christ is really, if not physically, present in the eucharist.

NEVIS, an island of the British West Indies, in the Leeward group, 2 m. from the S. E. extremity of St. Christopher, in lat. 17° 14' N., lon. 62° 40' W.; area, 45 sq. m.; pop. in 1871, 11,735. With the exception of a narrow circle of fertile land bordering upon the coast, the whole island may be said to consist of a single mountain 2,500 ft. high, the upper parts of which are not susceptible of cultivation. The arable lands, comprising in all only 6,000 acres, are well cultivated. Sugar is the staple, and with molasses and rum forms the bulk of the exports. The exports in 1870 amounted to £64,119, the imports to £54,286. The public revenue in 1872 was £7,776, the expenditures £10,477. The island is governed by a president, an executive council, and a legislative assembly of 11 members. Charlestown, on the S. W. coast, is the capital and principal town, and has a good roadstead. Nevis was colonized by English emigrants from St. Christopher in 1628, was taken by the French in 1706, and restored by the peace of Utrecht; it was taken by them again in 1782, but restored by the peace of 1783. It was the birthplace of Alexander Hamilton.

NEW ALBANY, a city, port of delivery, and the capital of Floyd co., Indiana, on the Ohio river, 2 m. below the falls, and opposite the W. end of Louisville, Ky., 100 m. S. of Indianapolis; pop. in 1850, 8,181; in 1860, 12,647; in 1870, 15,396; in 1874, according to local authorities, 22,246. It is finely situated, with wide streets, at right angles, upon two benches or plains that sweep N. by a gentle rise from the river. To the west and northwest is a range of hills from 300 to 500 ft. in height, called the Knobs. The chief public buildings are the court house, erected at a cost of \$140,000; a fine city hall; the opera house, costing \$100,000 and capable of accommodating 2,500; the masonic and odd fellows' halls; three large hotels; the railroad depot; and 10 large public school buildings. The fair grounds in the N. E. suburb comprise 72 acres, and contain a race course and appropriate buildings. There are four cemeteries in the vicinity of the city, one of them national. The railroads now in operation that terminate at New Albany are the Louisville, New Albany, and Chicago, the Jeffersonville, Madison, and Indianapolis, and the Louisville and New Albany, the last passing over the bridge at the falls. A steam ferry plies between the city and the W. end of Louisville, and a bridge across the Ohio at this point is projected. The Ohio river, within a distance of two miles

above New Albany, has a fall of 29 ft., affording the finest water power in the west. The river trade amounts to from \$15,000,000 to \$20,000,000 a year. A large wholesale business is carried on. Manufacturing is the most important interest of the city, embracing 142 large establishments, which in 1873 employed

3,681 hands and a capital of \$7,947,500, and produced goods to the value of \$24,486,574. Cottons, woollens, glass, machinery, and iron, brass, and wood work of all kinds, are produced. The works of the star glass company with their buildings and necessary grounds cover 15 acres; they are the most extensive



New Albany.

glass works in the United States, and the only ones producing polished plate glass. There are two large pork-packing establishments, and six banks (three national), with an aggregate capital of \$1,500,000.—New Albany is divided into six wards, and is governed by a mayor and a common council of two members from each ward. It has an excellent fire department, two public market houses, a street railroad, and is lighted with gas. The assessed value of property is \$10,000,000, about a third of the real value. The public schools are graded and embrace 53 departments, including high schools for both sexes. De Pauw female college (Methodist) was organized in 1846 and chartered in 1866. In 1873-'4 it had 6 instructors, 101 students, and a library of 1,000 volumes. A newspaper with daily and weekly editions is published. There are 30 churches, viz.: 3 Baptist, 1 Christian, 2 Episcopal, 2 Lutheran, 13 Methodist, 5 Presbyterian, 2 Roman Catholic, 1 United Brethren, and 1 Universalist.—New Albany was laid out in 1813, and was incorporated as a city in 1839.

NEWARK, a port of entry and the chief city of New Jersey, capital of Essex co., situated on the W. bank of the Passaic river, 4 m. above its entrance into Newark bay, and 9 m. W. of New York; pop. in 1840, 17,290; in 1845, 25,433; in 1850, 38,894; in 1855, 51,711; in 1860, 71,941; in 1865, 87,428; in

1870, 105,059, of whom 69,175 were natives and 35,884 foreigners, including 15,873 Germans, 12,481 Irish, and 4,041 English. The number of families was 21,631; of dwellings, 14,350. The city is divided into 15 wards, is for the most part regularly laid out, and embraces an area of about 17½ sq. m. The streets are generally wide and airy, and are bordered with many fine residences. The main street, called Broad street, is very spacious and handsome, 132 ft. wide and 2½ m. long, shaded with majestic elms, adorned with numerous tasteful edifices, and skirting in its course Washington, Military, and South parks, which are embowered with lofty elms. There are about 140 m. of improved streets, of which nearly 100 m. are graded, and more than 30 m. paved. The city is supplied with water collected from a large number of springs on the neighboring high grounds into a reservoir, and thence distributed by pipes. It is also supplied with gas, and has a system of sewerage, about 30 m. of sewers having been completed. There are four cemeteries within the limits of the city: Woodland, Fairmount, Mount Pleasant, and the Catholic cemetery. Mount Pleasant, the oldest, occupies 40 acres of ground on the Passaic river, and is elegantly laid out in winding avenues thickly shaded by ornamental trees and flowering shrubbery. Besides the churches, the most noteworthy buildings are

the custom house, city hall, and several of the banks and insurance buildings. Newark has ample means of communication with New York, Philadelphia, and the surrounding country, railroad trains running to New York every few minutes through the day. The lines are the New Jersey, Newark and New York, Morris and Essex, Newark and Elizabeth, Paterson and Newark, Newark and Bloomfield, Newark and Hudson, Newark and Clinton, and Montclair railroads. The Morris canal brings the coal of Lehigh valley through the heart of the city. Several lines of horse cars run to various parts of the city and to the adjoining towns. The value of imports into the customs district from foreign countries for the year ending June 30, 1874, was \$19,020; of exports to foreign countries, \$83,997. The number of entrances in the foreign trade was 35, with an aggregate tonnage of 4,562; clearances, 42, of 7,399 tons; number of entrances in the coastwise trade, 53, of 13,153 tons; clearances, 46, of 11,537 tons. The number of vessels belonging in the district was 136, of 12,158 tons, viz.: 49 sailing vessels, 2,604 tons; 26 steamers, 2,612 tons; 53 canal boats, 5,563 tons; and 8 barges, 1,379 tons.—Newark is noted for the extent and variety of its manufactures, among the most important of which are jewelry, saddlery and harness materials, felt and silk hats, patent leather and morocco, carriages, varnish, ale and lager beer, trunks and valises, chemicals, cotton thread, clothing, boots and shoes, agricultural implements, fertilizers, machinery, and sewing silk. The smelting and refining of gold, silver, and lead ores is also a prominent interest. The latest and most complete returns of the trade and manufactures of the city (for the year ending Dec. 31, 1871) embrace 1,015 establishments, employing 29,174 hands; capital invested, \$34,407,670; wages paid, \$14,767,257; value of products, \$72,879,036. The business of banking was started in Newark in 1805. There are now 11 banks, with an aggregate capital of \$5,783,500; 5 savings banks and 3 trust companies, with assets amounting to \$21,572,629 35; 3 life insurance companies, with \$30,141,486 54 assets; and 16 fire insurance companies, with \$5,681,426 71 assets. The mutual benefit life insurance company, one of the most prosperous in the country, has upward of \$28,500,000 assets. The total capital and assets of the financial institutions amount to \$63,179,042 60. There is a board of trade with 150 members, chartered in 1869.—The city is governed by a mayor and a board of 30 aldermen, and has an efficient fire department and an effective police force. The receipts into the city treasury for the year ending Dec. 31, 1873, including a balance on hand at the beginning of the period of \$439,635 62, were \$6,857,788 62; disbursements, \$6,577,721 78; balance, \$280,066 85. The total debt, less sinking fund, on Dec. 31, 1874, was \$5,599,511 51; assets of the city, \$5,503,156 78. The assessed valuation of property has been as follows: 1866, \$50,866,700; 1867, \$54,917,200; 1868, \$62,794,957; 1869, \$72,058,486; 1870, \$77,015,279; 1871, \$86,985,341; 1872, \$97,330,341; 1873, \$102,047,840; 1874, \$105,623,710. The principal charitable organizations are the city reform school, Essex county home for the insane, Newark orphan asylum, German hospital, city dispensary, boys' lodging house and children's aid society, hospital of St. Barnabas, society for the relief of respectable aged women, home for the friendless, St. Michael's hospital, St. James's hospital and orphan asylum, St. Vincent's industrial school, St. Peter's orphan asylum and kindergarten, St. Mary's orphan asylum, and the New Jersey home for disabled soldiers. There is an excellent system of public schools, embracing a high school, 12 grammar schools, 20 primary schools, 2 primary industrial schools, 7 evening schools, and a Saturday normal school. The number of school buildings owned by the city is 21; value of sites, \$375,000; of buildings and furniture, \$645,000. The number of children between the ages of 5 and 18 years in 1873 was 30,045; number of pupils enrolled in day schools, 15,090; in evening schools, 1,495; number of teachers employed in day schools, 218; in evening schools, 35; in Saturday normal school, 4; expended for support of schools, \$187,553 57; for school houses, \$100,017 09. Newark academy, incorporated in 1795, is one of the oldest institutions in the state. There are several well attended Catholic schools. There are two libraries, that of the Newark library association, containing 20,000 volumes, and that of the New Jersey historical society, containing 6,000 volumes and 10,000 pamphlets, besides manuscripts of great value and rarity, and a cabinet of curiosities and relics. There are 6 daily (1 German) and 11 weekly (2 German) newspapers, and a monthly periodical. The number of churches (besides 10 missions) is 93, viz.: Baptist, 13; Congregational, 2; Episcopal, 11; German Evangelical Protestant, 1; Jewish, 3; Lutheran, 3; Methodist, 18; Methodist Protestant, 2; Presbyterian, 18; Reformed, 9; Roman Catholic, 8; Second Adventist, 1; Spiritualist, 1; Swedenborgian, 1; Unitarian, 1; Universalist, 1.—Newark was settled in May, 1666, by about 30 families from Milford and New Haven, Conn., under the lead of Capt. Robert Treat, afterward governor of Connecticut, to which he returned at a later period. In 1667 they were joined by about an equal number of settlers from Guilford and Branford, Conn., under the lead of the Rev. Abraham Pierson, their minister, who having in early life preached in Newark, England, gave that name to the new town. Their object seems to have been to establish a Puritan community, to be administered under the laws of God, by members of the church, on strictly democratic principles. The settlers laid out the town plat of Newark, with its spacious streets and parks as they now exist. During

the revolution the town was successively occupied by the American and British troops, and was subject to incursions from New York. On the establishment of peace it received a new impulse, and soon became very prosperous. It was incorporated as a city in 1836.

NEWARK, a city and the capital of Licking co., Ohio, at the confluence of three branches of the Licking river, on the Ohio canal and on the Baltimore and Ohio and the Pittsburgh, Cincinnati, and St. Louis railroads, 33 m. E. by N. of Columbus; pop. in 1850, 3,654; in 1860, 4,675; in 1870, 6,698. It is situated on a level plain, in the midst of a productive country, and is well built and laid out with spacious streets. In the vicinity are quarries of sandstone, an extensive coal mine, and several coal oil factories. The city contains two banks, graded public schools, and three newspapers.

NEWARK, a municipal and parliamentary borough of Nottinghamshire, England, on an E. branch of the Trent, 114 m. N. N. W. of London, with which it is connected by the Northwestern and Midland railways; pop. in 1871, 12,195. It is well paved and lighted with gas. The ancient church of St. Mary Magdalene, partly rebuilt in the time of Henry VI., and recently restored, is one of the largest and finest churches in the kingdom. Newark has a spacious market place, a town hall, grammar school, public charities, and a large trade in corn, coal, cattle, wool, and especially malt and flour. Here are the ruins of a castle in which King John died in 1216. Charles II. incorporated the town for its loyalty to his father during the civil wars.

NEWAYGO, a W. county of the southern peninsula of Michigan, watered by the Muskegon,

Marquette, and other streams; area, about 875 sq. m.; pop. in 1870, 7,294. The soil is fertile. The surface is nearly level and mostly covered with forests of pine, sugar maple, &c. The county is traversed by the Big Rapids branch of the Chicago and Michigan Lake Shore railroad, and by the Grand Rapids, Newaygo, and Lake Shore line. The chief productions in 1870 were 37,438 bushels of wheat, 10,385 of rye, 42,378 of Indian corn, 25,999 of oats, 66,746 of potatoes, 5,877 tons of hay, 8,726 lbs. of wool, 109,064 of butter, and 46,298 of maple sugar. There were 784 horses, 1,007 milch cows, 2,084 other cattle, 2,940 sheep, and 1,997 swine; 2 flour mills, and 11 saw mills. Capital, Newaygo.

NEW BEDFORD, a city, port of entry, and one of the capitals of Bristol co., Mass., in lat. $41^{\circ} 38' N.$, lon. $70^{\circ} 55' W.$, 50 m. S. by E. of Boston; pop. in 1870, 21,300. The municipal limits embrace an area 11 m. long by 2 m. wide; the city proper, about 2 m. long and 1 m. wide, is on the W. side of Acushnet river, whose mouth here forms a commodious harbor and is crossed by a bridge 4,000 ft. long. The notable public buildings are the city hall, a Doric granite structure, the Unitarian and Catholic churches, the custom house, the almshouse, which accommodates 400 inmates, the public library, and the house of correction. There is a strong fortification at the entrance of the harbor; and around Clark's point, at the S. end of the city, is a fine public drive $4\frac{1}{2}$ m. long. The city water works were constructed in 1867-'9, at a cost of nearly \$1,000,000. From the head of Acushnet river, which is dammed up to form a reservoir with a capacity of 400,000,000 gallons, the water is brought



New Bedford.

6 m., and is pumped for distribution to a height of 100 ft. The city has a paid fire department. A street railroad was constructed in 1872. The school system includes a high school and 23 grammar and primary schools, with 99 teachers

and 3,500 pupils. The public library, established in 1803, was assumed by the city in 1852, and became the first free public library in the United States. A fine building was erected for it in 1857, at a cost of \$45,000. In 1870 it had

30,000 volumes. In 1863 Miss Sylvia A. Howland bequeathed to the city \$100,000 for the increase of this library and the support of liberal education, and an equal sum for the introduction of water. There are 27 religious societies, a domestic missionary society with two free chapels, a young men's Christian association, a Roman Catholic hospital, an orphan asylum, and a "Union for Good Works." New Bedford has long been the chief seat of the American whale fishery, which was pursued here as early as 1755. In 1765 four vessels were engaged in it, and at the revolution from 50 to 60, most of which were destroyed during the war. The business revived, but was again prostrated by the war of 1812. In 1818 it received a fresh impulse, and continued to flourish till 1853-'4, which was the culminating point of its prosperity. At that time there were 410 whalers, of 132,966 tons, in the district, and the imports were 44,923 bbls. of sperm oil, 118,672 of whale oil, and 2,838,800 lbs. of whalebone. The panic of 1857, the destruction of 30 whalers by confederate cruisers during the civil war, the wrecking of 24 at one time in the N. Pacific in 1871, and the substitution of other articles for the products of the fishery, proved disastrous, and it is rapidly on the decline. In December, 1873, the vessels engaged in it in the United States numbered 171, of which 128, of 35,261 tons, belonged in New Bedford. The proceeds were 30,961 bbls. of sperm oil, value \$1,251,109; 25,729 of whale oil, \$413,555; and 150,598 lbs. of bone, \$162,645; these constituted about three fourths of the entire importation. The other imports in 1873 amounted to \$160,000; exports, \$32,350; duties collected, \$36,000; entries, 62; clearances, foreign 33, domestic 136. The loss occasioned by the decline of the whale fishery has been partly compensated by increased attention to manufactures. The principal establishments are the Wamsutta cotton mills, with a capital of \$2,000,000, running four mills with 86,000 spindles, and producing in 1873 goods to the value of \$2,500,000; the Potemka mills for print cloths, erected in 1871, with a capital of \$500,000, 2,000 looms, and 22,500 spindles, and products in 1873 of about \$1,000,000; the Gosnold iron mills, copper works, cordage factory, twist drill works, glass works, tannery, Prussian blue works, four oil and candle works, paraffine manufactory, five shoe factories, two manufacturing photographic establishments, gas works, kerosene oil works, two flour mills, and three paint mills. The aggregate value of the manufactured products in 1873 was about \$8,000,000. The valuation of property in 1874 was: real estate, \$11,665,400; personal, \$11,719,900. There are four national banks, with an aggregate capital of \$3,200,000; two savings banks, with deposits in 1874 of \$10,021,921; one fire and one marine insurance company; two daily and two weekly newspapers, and a weekly shipping list. There is a line of steamers to New York, and one to Martha's

Vineyard. The New Bedford railroad was formed in 1873 by a consolidation of roads running to Framingham, Mass., and was extended to the water front of the city. Large amounts of coal are brought here for distribution, and return freights extensively taken to points south. A branch road from Fairhaven, on the opposite side of Acushnet river, communicates with the Old Colony road, and affords an additional route to Boston and Cape Cod.—New Bedford was originally part of Dartmouth, from which it was set off as a town in 1787. It received a city charter in 1847. It was at one time the wealthiest city in the United States in proportion to its population.

NEW BERNE, or **Newbern**, a city and the capital of Craven co., North Carolina, the port of entry of the district of Pamlico, on the S. W. bank of the river Neuse at its confluence with the Trent, 40 m. from its mouth, and on the Atlantic and North Carolina railroad, 107 m. by rail S. E. of Raleigh; pop. in 1850, 4,681; in 1860, 5,432; in 1870, 5,849, of whom 3,829 were colored. Ocracoke inlet affords communication with the sea. There are lines of steamers to New York, Baltimore, and Norfolk. The city has a considerable commerce, principally coastwise. The chief articles of trade are cotton, lumber, naval stores, and fish. The value of foreign commerce for the year ending June 30, 1874, was \$12,212; entrances and clearances, 13, of 1,021 tons; entrances in the coastwise trade, 179, of 31,807 tons; clearances, 80, of 17,992 tons; belonging to the district, 67 vessels, of 1,412 tons. There are several turpentine distilleries, founderies and machine shops, grist and saw mills, manufactories of carriages, agricultural implements, &c. The city has an academy, several good private schools, a national bank, a daily and three weekly newspapers, a monthly magazine, and Baptist, Christian, Episcopal, Methodist, Presbyterian, and Roman Catholic churches. It was at one time the capital of the province of North Carolina.—During the civil war New Berne, which was defended by intrenchments and breastworks, was captured by Gen. Burnside, after a severe fight, March 14, 1862. Sixty-nine cannon and much ammunition were taken, and the city suffered considerably by fire.

NEWBERRY, a N. central county of South Carolina, bounded N. in part by the Ennoree and Tiger rivers, E. by the Broad, and S. by the Saluda; area, 616 sq. m.; pop. in 1870, 20,775, of whom 13,318 were colored. The surface is rolling, and the soil fertile, especially near the streams. It is traversed by the Greenville and Columbia and the Laurens railroads. The chief productions in 1870 were 41,914 bushels of wheat, 152,232 of Indian corn, 27,701 of oats, 14,072 of sweet potatoes, and 9,836 bales of cotton. There were 1,259 horses, 1,754 mules and asses, 2,379 milch cows, 3,109 other cattle, 2,801 sheep, and 6,967 swine. There were 9 manufacturing establishments. Capital, Newberry Court House.

NEWBERRY, John Strong, an American geologist, born at New Windsor, Conn., Dec. 22, 1822. His father in 1824 emigrated to Ohio, where he founded the town of Cuyahoga Falls. He graduated at the Western Reserve college in 1846, and at the Cleveland medical college in 1848. In 1849-'50 he travelled and studied abroad, and upon his return established himself in 1851 as a physician in Cleveland, Ohio. In 1855 he was appointed acting assistant surgeon and geologist in the expedition under Lieut. Williamson to explore the country between San Francisco and the Columbia river. The results of this expedition are embodied in vol. vi. of the "Pacific Railroad Reports." The reports of Dr. Newberry on "The Geology, Botany, and Zoölogy of North California and Oregon" were published separately in a quarto volume, with 48 illustrations. In 1857-'8 he accompanied Lieut. Ives in the exploration and navigation of the Colorado river, and prepared half of the report, containing, in the words of the commanding officer, "the most interesting material gathered by the expedition." In 1859 he was connected with another party sent out by the war department for the exploration of the San Juan and upper Colorado rivers. During the summer the party travelled over a large part of what is now southern Colorado, northern Arizona, and New Mexico, a region before almost unknown. The report of this expedition remains (1875) still unpublished. During the civil war Dr. Newberry was secretary of the western department of the sanitary commission. In 1866 he was appointed professor of geology in the school of mines of Columbia college, New York, and in 1869 became also state geologist of Ohio. He was one of the original corporators of the national academy of sciences, has been president of the American association for the advancement of science, and is president of the New York lyceum of natural history. His most valuable papers have been upon the drift and carboniferous formations, and on fossil fishes and plants.

NEW BRIGHTON, N. Y. See **STATEN ISLAND**.

NEW BRIGHTON, a borough of Beaver co., Pennsylvania, on the E. bank of Beaver river, here crossed by a bridge, 3 m. above its entrance into the Ohio, and on the Beaver and Erie canal and the Pittsburgh, Fort Wayne, and Chicago railroad, 25 m. N. N. W. of Pittsburgh; pop. in 1870, 4,037. It is a place of active business, and the river supplies water power for factories of various kinds, consisting of a large woollen factory, extensive flax mills, the largest chain factory in the United States, novelty works, a keg factory, a foundery, two machine shops, a planing mill, three large flouring mills, and various other smaller industrial works. There are graded public schools, a weekly newspaper, a national bank, two banking houses, and eight churches.

NEW BRITAIN, the name of one large and several smaller islands in the Pacific ocean,

between lat. 4° and 6° 30' S., and lon. 148° and 152° 30' E.; extreme length of the large island about 300 m., breadth from 5 to 50 m.; area, about 10,000 sq. m. It is of crescent shape, and is separated on the west from Papua by Dampier's strait, and on the northeast from New Ireland by St. George's channel, the former being about 50 and the latter 25 m. wide. There are several fine bays and harbors, and at Spacious bay, the E. headland of which is in lat. 5° 2' S., lon. 152° 7' E., there is supposed to be a channel extending across the island. In the interior there are high mountains, and in the north active volcanoes. Bordering the coast are extensive fertile plains, and much of the surface is covered with forests. The principal productions are palms, sugar cane, breadfruit, pigs, turtles, and fish. The inhabitants are a tribe of oriental negroes or negritos, well made, and very dark.

NEW BRITAIN, a town of Hartford co., Connecticut, on the Hartford, Providence, and Fishkill railroad, and a branch of the New York, New Haven, and Hartford railroad, 8 m. S. W. of Hartford; pop. in 1870, 9,480. It is lighted with gas, has a steam fire engine, and an ample supply of water is obtained from a reservoir of 175 acres, at an elevation of 200 ft., throwing a jet from the fountain on the public square to the height of 140 ft. The chief business is the manufacture of builders' hardware. There are also two extensive hosiery manufactories, employing several hundred hands each, malleable iron works, and manufactories of cutlery, jewelry, lace, hooks and eyes, cabinet hardware, harness trimmings, &c. It contains a national bank, a weekly newspaper, three large public school buildings, two seminaries, the state normal school, and six churches. It was formed from the town of Berlin in 1850.

NEW BRUNSWICK, a province of the Dominion of Canada, situated between lat. 44° 35' and 48° 5' N., and lon. 63° 47' and 69° 5' W.; average length N. and S. 180 m., average breadth 150 m.; area, 27,322 sq. m. It is bounded N. by Quebec and the bay of Chaleurs, E. by the gulf of St. Lawrence and Northumberland strait, which separates it from Prince Edward island, S. by Nova Scotia and the bay of Fundy, W. by Maine, and N. W. by Quebec. The province is divided into 15 counties, viz.: Albert, Carleton, Charlotte, Gloucester, Kent, Kings, Madawaska, Northumberland, Queens, Restigouche, St. John, Sunbury, Victoria, Westmorland, and York. These are subdivided into parishes. There are two cities: St. John (pop. in 1871, 28,805), the commercial metropolis, and Fredericton (pop. 6,006), the capital; and four incorporated towns: Moncton, Portland, St. Stephen, and Woodstock. The population of the province in 1784 was 11,457; in 1824, 74,176; in 1834, 119,457; in 1840, 156,162; in 1851, 193,800; in 1861, 252,047; in 1871, 285,594. Of the last number 237,837 were born in the province, 5,239 in Nova Scotia, 2,439 in Que-

bec, and 220 in other parts of Canada, 2,409 in Prince Edward island and Newfoundland, 23,065 in Ireland, 4,691 in Scotland, 4,558 in England and Wales, and 4,088 in the United States; 100,648 were of Irish, 83,598 of English, 44,907 of French, 40,858 of Scotch, 6,004 of Dutch, 4,478 of German, 1,701 of African, and 1,096 of Welsh origin, and 1,403 were Indians (chiefly Micmacs and Malicetes); 145,888 were males and 139,706 females. There were 49,384 families and 43,579 occupied dwellings. There were 19,002 persons over 20 years of age unable to read (10,197 males and 8,805 females), and 27,669 (13,245 males and 14,424 females) unable to write. There were 306 deaf and dumb persons, 216 blind, and 788 of unsound mind.—The surface of New Brunswick is generally flat or undulating. There are some elevated lands skirting the bay of Fundy and the St. John river, but the only section of a mountainous character is that on the border of Quebec in the north, where the country is beautifully diversified by oval-topped hills, from 500 to 800 ft. high, surrounded by valleys and table lands. The shores of the gulf of St. Lawrence and Northumberland strait, for about 15 m. inland, are low and skirted with marshes. The coast line of the province is 545 m. long, not including indentations of the land, and is interrupted only at the point of junction with Nova Scotia, where an isthmus not more than 14 m. wide connects the two provinces, and separates the waters of Northumberland strait from those of the bay of Fundy. The coast of this bay is generally bold and rocky. There are numerous good harbors, particularly on the S. portion of the E. coast. The principal bays are the Nepisiguit, opening into the bay of Chaleurs; Miramichi and Shediac, on the E. coast; Passamaquoddy, at the S. W. extremity of the province; and the harbor of St. John, on the S. coast. Bay Verte and Chignecto bay are opposite each other, the former E. and the latter W. of the isthmus that connects with Nova Scotia. The principal islands are Grand Manan, at the entrance of the bay of Fundy; Campo Bello and Deer islands, in Passamaquoddy bay; Portage island, in Miramichi bay; and Shippegan and Miscou islands, at the N. E. extremity of the province. The largest river is the St. John, which for 75 m. below the mouth of the St. Francis forms the boundary with Maine, and afterward entering the province flows S. E. for 225 m., emptying into the bay of Fundy at St. John. It is navigable by vessels of 120 tons to Fredericton, 84 m. from its mouth, and by small steamers to Grand Falls, 140 m. further up. The chief tributaries are the St. Francis (which separates the W. extremity of the province from Maine), Madawaska, and Green, from the north; the Tobique, Nashwaak, Salmon, Washademoak, and Kennebecasis, from the east; and the Aroostook and Oromocto, from the west. The St. Croix forms the S. portion of the Maine bound-

dary. It is about 125 m. long, and is navigable to St. Stephen, 15 m. above its mouth in Passamaquoddy bay. The Peticodiac, about 100 m. long, empties into the bay of Fundy near its head; it is navigable by large vessels for 25 m., and for schooners of 60 or 80 tons to the head of tide, 12 m. further. The N. portion of the province is drained by the Restigouche, which forms a part of the boundary with Quebec, and empties into the bay of Chaleurs. It is navigable by large vessels for 18 m. Its chief tributaries in New Brunswick are the Upsalquitch and Wetomkegewick. The Nepisiguit river after a course of about 100 m. empties into the bay of the same name. The Miramichi river flows N. E. about 225 m., and discharges into Miramichi bay; it is navigable by large vessels for 25 m., and for schooners to the head of tide, 20 m. further up. The Richibucto river, navigable for small vessels for 15 m., empties into the gulf of St. Lawrence, at Richibucto, near the entrance of Northumberland strait. The principal lakes are Grand lake, 25 m. long by 6 m. wide, which discharges into the river St. John, 50 m. from the sea; Oromocto lake, which gives rise to the river of the same name; and Grand lake on the Maine border, the source of the St. Croix.—The geological structure of the province is not remarkable. The N. W. portion is occupied by the upper Silurian formation. Bordering on this, and stretching S. W. across the province from Nepisiguit bay, crossing the St. John river just above Fredericton, are two belts of lower Silurian, enclosing a belt of granitic and similar rocks. S. E. of these the country is carboniferous. Small areas of the Devonian, Huronian, and Laurentian formations occur along the bay of Fundy. Gypsum, freestone, and grindstone abound. The deposits of bituminous coal in the central portion of the province are very extensive, but the mineral occurs in thin seams. Only a small quantity is mined. Salt springs are numerous. Copper is found on the banks of the Nepisiguit river and plumbago near St. John. Antimony, iron ore, manganese, and other minerals also occur in considerable quantities.—The climate is healthy, though it is subject to great extremes. The S. portion has a considerably milder temperature than the N., but the whole country is covered with snow for about four months of the year (from December to April). S. W. winds in summer often produce dense fogs on the bay of Fundy, which extend 15 or 20 m. inland. The autumn is long, and is the pleasantest season of the year, the air being clear and dry. The extremes of temperature in the interior are -30° and $+95^{\circ}$.—E. of the St. John the soil is deep and fertile; W. of that river it is poorer. Indian corn is grown in the south; wheat, barley, oats, buckwheat, rye, potatoes, turnips, peas, beans, &c., yield abundantly. Apples, pears, plums, cherries, currants, gooseberries, and strawberries thrive. Grass grows luxuriantly, especially on the ex-

tensive marshes that have been reclaimed from the sea, and the greater portion of every large farm is devoted to its production. The forests of pine, spruce, cedar, &c., which cover a large portion of the province, yield large quantities of timber for export and ship building; and lumbering is one of the chief industries of the people. Among wild animals are bears, moose and other deer, foxes, wild cats, raccoons, beavers, otters, and porcupines. The rivers and lakes abound in salmon, trout, chub, eels, and perch; and cod, mackerel, and herring are abundant on the coast, particularly in the bay of Chaleurs and the bay of Fundy. Lobsters abound, and there are prolific oyster beds on the E. coast.—The principal articles of manufacture are lumber, leather, woollen goods, wooden ware, paper, iron castings, mill machinery, locomotives, steam engines, &c. Ship building is extensively carried on. (For industrial statistics, see APPENDIX to this volume.) The fisheries and foreign commerce are important interests. The number of men employed in the fisheries for the year ending June 30, 1874, was 6,556; number of vessels, 131, of 2,518 tons; of boats, 3,351; value of vessels and boats, \$235,211; of nets and weirs, \$240,461. The value of the catch was \$2,685,793 91, of which salmon, herring, cod, and lobsters constituted the largest part; the other kinds were alewives, hake, pollack, oysters, smelts, mackerel, eels, bass, shad, and haddock. The value

of goods entered for consumption from foreign countries for the same period was \$10,223,871, including \$5,876,058 from Great Britain, \$3,894,484 from the United States, \$320,516 from the West Indies, and \$94,879 from France. The total value of exports was \$6,503,934 (including \$4,201,438 to Great Britain, \$1,247,364 to the United States, \$525,548 to the West Indies, \$77,375 to South America, \$26,716 to France, \$15,880 to the Canary islands, \$14,239 to Holland, and \$11,023 to Newfoundland), of which \$361,977 represented foreign, and \$6,141,957 Canadian produce, viz.: products of the mine, \$223,340; of the fisheries, \$392,772; of the forest, \$4,711,812; animals and their produce, \$208,902; agricultural products, \$110,856; manufactures, \$477,898; miscellaneous articles, \$15,377. The imports consist chiefly of cottons, woollens, fancy goods, hardware, iron, flour, tea, sugar, molasses, and spirits. The number of entrances was 2,784, with an aggregate tonnage of 775,638, of which 1,275, of 390,290 tons, were in ballast; clearances, 2,662, with an aggregate tonnage of 799,265, of which 25, of 12,351 tons, were in ballast; built during the year, 96 vessels, with an aggregate tonnage of 46,663. The number of vessels of all kinds belonging in the province at the close of 1873 was 1,147, with an aggregate tonnage of 277,850.—The statistics of the railroads in operation in the province for 1874 are contained in the following table:

LINES.	TERMINI.	Miles in operation in the province.
European and North American	St. John to Bangor, Me. (206 m.)	92
Fredericton	Fredericton Junction, on European and North American railway, to Fredericton	23
Intercolonial	St. John to Halifax, N. S. (276 m.)	132
Branch	Painsee Junction to Point du Chene	11
New Brunswick	Fredericton to Edmundston (170 m.); completed to Florenceville..	71
Branch	Woodstock Junction to Woodstock	9
New Brunswick and Canada	St. Andrews to Woodstock	93
Branches	{ Watts Junction to St. Stephen	19
	{ Debec Junction to Houlton, Me. (8 m.)	5
Total		455

The Intercolonial line is to be extended from Moncton N. and then W. to Rivière du Loup, Quebec, a distance of 374 m., of which about 200 m. lie in New Brunswick. The New Brunswick railway is intended to connect at Edmundston with the New Brunswick and Quebec line for Rivière du Loup, 90 m. further. There are four banks, with an aggregate capital of upward of \$1,500,000; eight branches of banks of other provinces; and a savings bank at St. John. The deposits in the government savings banks, exclusive of post office savings banks, on May 31, 1874, amounted to \$1,109,705.—The chief executive officer is the lieutenant governor, appointed by the governor general of the Dominion in council for five years, assisted by an executive council of nine members (president of the council, secretary and receiver general, attorney general, chief commissioner of public works, surveyor gen-

eral, and four without office), appointed by himself and responsible to the assembly. The legislative authority is exercised by a legislative council of 15 members, appointed by the lieutenant governor in council for life, and a house of assembly of 41 members, elected by districts. Voting is by ballot, and a small property qualification is required for voters, who must also be male British subjects and 21 years of age. The judicial power is vested in a supreme court, consisting of a chief justice and four associate justices, who hold circuit courts in each county, county and probate courts, and justices of the peace. The court of divorce and matrimonial causes is held by a single judge, and there are a vice-admiralty court with a judge and deputy judge, and a court for the trial and punishment of piracy and other offences on the high seas, consisting of the lieutenant governor, judges of the su-

preme court, and other officials. New Brunswick is represented by 12 senators and 16 members of the house of commons in the Dominion parliament. The balance in the treasury on Oct. 31, 1873, was \$151,400 38; receipts for the year 1873-'4, \$591,464 59, including \$516,155 from the Dominion government; expenditures, \$589,793 61, including \$12,749 for agriculture, \$60,607 for executive, legislative, and judicial departments, \$22,000 for immigration, \$25,000 for lunatic asylum, \$7,208 for public health, \$10,587 for public printing, \$201,264 for roads, \$8,844 for university, \$20,000 for bridges, and \$19,000 for steam navigation; balance in treasury Oct. 31, 1874, \$153,071 36. The penitentiary at St. John on Dec. 31, 1873, contained 30 convicts. The provincial lunatic asylum at St. John was opened in 1848; the number of inmates on Oct. 31, 1873, was 243 (128 males and 115 females). The capacity of the asylum is not equal to the demand for admission. According to the census of 1871, there were 9 hospitals, with 84 inmates; 2 orphan asylums, with 77 inmates; 9 other asylums (exclusive of the lunatic asylum), with 305 inmates; and 14 jails, with 149 inmates.—A system of free public schools was established by an act of 1871. These schools are under the general supervision of a chief superintendent of education for the province, with a county inspector for each county and boards of trustees for the several districts, and are supported by a provincial grant and a county tax equal to 30 cents per head, supplemented by a local tax, which includes a poll tax of \$1 per head. The expenditures from the provincial treasury for school purposes during the year ending April 30, 1874, were \$122,067 69. The number of schools in operation during the summer term ending Oct. 31, 1874, was 1,049, with 1,077 teachers and 45,539 pupils; number in attendance some portion of the year ending on that date, 60,467; number of school districts, 1,392; number of school houses, 1,050. There is a provincial training and model school at Fredericton. The university of New Brunswick at Fredericton was established by provincial charter as the college of New Brunswick in 1800, incorporated by royal charter under the name of King's college in 1828, and reorganized under its present title in 1860. It embraces a classical course of three years, and special courses in civil engineering and surveying, agriculture, and commerce and navigation. There is an annual scholarship of \$60 for one student from each county, who also receives tuition free, and there are 56 free scholarships, distributed among the counties and cities, exempting from the payment of tuition fees alone. In 1872-'3 the number of professors was 7; students, 51. There is a collegiate school connected with the university. Mount Allison Wesleyan college at Sackville, under the control of the Methodists, was organized in 1862, and is open to both sexes. It

has classical, scientific, and special courses, and provision is made for theological instruction. A male academy and commercial college, in operation more than 30 years, and a female academy, organized in 1854, are connected with it. In 1873-'4 these institutions had 15 professors and instructors (5 in the college), 213 students (34 in the college), and a library of 4,000 volumes. St. Joseph's college (Roman Catholic) at Memramcook has a commercial course of four years and a classical course of five years, both taught through the medium of the French and English languages. In 1874-'5 it had 18 professors and instructors, 140 students, and a library of 1,000 volumes.—The number of newspapers and periodicals published in the province in 1874 was 33, viz.: 4 daily, 3 tri-weekly, 21 weekly (1 French), 4 monthly, and 1 quarterly. The number of the inhabitants in 1871 belonging to the various religious denominations and the number of churches and buildings attached thereto are shown in the following table:

DENOMINATIONS.	Number of adherents.	Churches.	Buildings.
Baptists	70,597	226	238
Episcopalians	45,481	115	150
Methodists	29,856	113	186
Presbyterians	38,552	80	87
Roman Catholics	96,016	103	161
Other denominations	4,792	19	23
Total.....	285,594	656	795

Of the Baptists 27,866 were Freewill Baptists, and of the Methodists 26,212 were Wesleyans. The principal denominations not named in the table were Adventists (711), Christian Conference (1,418), Congregationalists (1,193), and Universalists (590).—New Brunswick and Nova Scotia originally formed one French colony, called Acadia or New France. The first settlement within the present limits of New Brunswick was made by the French on the bay of Chaleurs in 1639. Other settlements were made in 1672 on the Miramichi river and elsewhere on the E. coast. In 1713 Acadia was ceded to the English by the treaty of Utrecht. The first British settler established himself on the Miramichi in 1764, and in 1784 New Brunswick was separated from Nova Scotia, and erected into a distinct colony. The first legislative assembly met at St. John in January, 1786. At the close of the American revolution about 5,000 loyalists from the United States settled here, and their descendants now form a considerable portion of the population. In October, 1825, the standing timber in the region around Miramichi bay took fire, enveloping an area of 6,000 sq. m. in flames. Two towns and about 500 persons were destroyed. In 1848 responsible government was introduced. In 1867 New Brunswick became one of the original provinces of the Dominion of Canada.

NEW BRUNSWICK, a city and the capital of Middlesex co., New Jersey, situated at the head

of navigation on the S. W. bank of the Raritan river, about 15 m. above its mouth, at the terminus of the Delaware and Raritan canal, and on the New Jersey division of the Pennsylvania railroad, 28 m. S. W. of New York; pop. in 1860, 11,256; in 1870, 15,058. The oldest parts of the town are built on low land, but a large and by far the pleasantest portion is upon the high and sloping ground which, in the form of a crescent, half encircles the original location. This portion is well laid out with wide streets, and contains many handsome residences. The court house is near the centre of the city. The opera house and masonic hall are fine buildings. New Brunswick is largely engaged in manufactures, containing extensive India-rubber factories, and manufactories of harness, hosiery, iron, machinery, leather, paper hangings, &c. It has two banks, a high school and other public schools, several private schools, two daily and two weekly newspapers, two monthly periodicals, and 17 churches. The city is the seat of Rutgers college (Reformed), founded in 1770, occupying an elevated and beautiful situation in the N. portion. A grammar school and the state college of agriculture and the mechanic arts (as the scientific department) are connected with it. (See **RUTGERS COLLEGE**.) The theological seminary of the Reformed (Dutch) church, established here in 1810, occupies a commanding position N. of the college. It has three fine buildings, Hertzog hall, Suydam hall, and the library. In 1874-'5 it had 4 professors, 39 students, and a library of 20,000 volumes.—New Brunswick was settled about the close of the 17th century by emigrants from Long Island, and was

incorporated as a town in 1736. During the revolution it was at different times the headquarters of each of the opposing armies, and remains of their works are still to be seen in the vicinity. The city was incorporated in 1784.

NEWBURGH, a city and one of the county seats of Orange co., New York, on the W. bank of the Hudson river, 61 m. by the river N. of New York, and 84 m. S. of Albany; pop. in 1870, 17,014, of whom 4,346 were foreigners. It is the terminus of the Newburgh branch of the Erie railway. Ferries connect it with Fishkill Landing and Dutchess Junction, stations on the Hudson River railroad, on the opposite bank of the river, the last named station being the river terminus of the New York, Boston, and Montreal railway. It is situated on a steep slope rising from the river to a height of 150 ft. Water is supplied from Little pond, 3 m. distant, the works for which cost \$96,000. "Washington's Headquarters," an old stone mansion overlooking the Hudson, is owned and kept in order by the state. Besides its association with the revolutionary war and its great chief, the building contains numerous interesting relics of that period. Newburgh owns considerable shipping, and has an important trade, the receipts of lumber and produce by rail being extensive. Steamers run regularly to New York, Albany, and intermediate points. Its manufactures are extensive, embracing engines, boilers, and other machinery, iron castings, carpets, cotton goods, beer, horse blankets, brass, cement pipe, paper, pianos and organs, &c. There are three national banks, with a joint capital of \$1,550,000, and a savings bank. The city contains ten private



Newburgh.

schools, good public schools, embracing an academy and five grammar schools, a free public library under the charge of the board of education, and two daily and three weekly newspapers. The Newburgh theological seminary (United Presbyterian) was organized in

1804, and chartered in 1835. In 1873-'4 it had 3 instructors, 12 students, and a library of 3,450 volumes. There are 22 churches, viz.: 3 Baptist, 4 Episcopal, 5 Methodist, 6 Presbyterian, 2 Reformed, 1 Roman Catholic, and 1 Unitarian. The city was incorporated in 1865.

NEWBURYPORT, a city, port of entry, and one of the shire towns of Essex co., Massachusetts, situated on the S. bank of the Merrimack river, 3 m. from its mouth, and 34 m. N. N. E. of Boston, in lat. $42^{\circ} 48' 30''$ N., lon. $70^{\circ} 52' 3''$ W.; pop. in 1840, 7,160; in 1850, 9,572; in 1860, 13,401; in 1870, 12,595.

The Eastern railroad passes through it, and it is the terminus of a branch of the Boston and Maine railroad. Horse cars run to different parts of the city and to Amesbury, and several lines of stages ply to the adjoining towns. The city is situated on a swell of land rising gradually to the height of 100 ft. from the river, and



Newburyport.

commands a fine view of the ocean and the surrounding country. The streets are laid out regularly, and finely shaded with trees; and High street, the principal thoroughfare, extending for 3 m. parallel to the river, and about a quarter of a mile from it, is one of the most beautiful streets in New England. In the centre of the city is a fine mall, extending around a beautiful pond of six acres. Near the city is Oak Hill cemetery. The principal public buildings are the custom house, city hall, and court house. Some of the churches are of admirable architecture. Under the Federal street church are the remains of George Whitefield, who died here in 1770. The same church contains a whispering gallery, where a slight whisper can be heard 115 ft. The harbor is formed by the position of Plum island along the mouth of the river, and is safe and commodious. The bar at the mouth of the river is shifting, with 9 ft. of water at low and 17 at high tide. The value of imports from foreign countries for the year ending June 30, 1874, was \$227,353; exports to foreign ports, \$42,739; entrances in the foreign trade, 19, of 2,530 tons; clearances, 34, of 7,837 tons; entrances in the coastwise trade and fisheries, 633, of 63,405 tons; clearances, 607, of 69,678 tons; engaged in the cod and mackerel fisheries, 33 vessels, of 1,316 tons; belonging in the district, 67, of 12,865 tons. Ship building forms a prominent business of the place. Vessels were built here as early as 1680, and in 1766 there were 72 vessels on the stocks at one time. In 1854, 20,000 tons of shipping of different kinds were built, the vessels varying

from 100 to 1,600 tons, and employing 1,000 men. After that the business was depressed, but is now increasing, and 18 vessels, aggregate tonnage 15,000, were built in 1874, the largest being 1,608 tons. There are four manufacturing corporations, with an aggregate capital of \$1,200,000, employing 1,125 hands, running 35,216 spindles, and manufacturing 16,276,000 yards of print cloths and fine sheetings and shirtings annually. There are also manufactories of boots and shoes, combs, hats, steam pumps, paper, iron and brass castings, machinery, jewelry, &c. The city contains four national banks, with an aggregate capital of \$820,000; two savings banks, with deposits amounting to \$5,300,000; and an insurance company. It is divided into six wards, and is governed by a mayor, a board of aldermen of six, and a common council of 18 members, and has a police force, a police court, and a fire department. There are several charitable organizations, the most important of which is the old ladies' home of the society for the relief of aged females. The public schools of Newburyport have long occupied a high rank. The female high school was the first of the kind established in the country; the Putnam free school, supported by a fund of \$50,000, is open to all without regard to residence; these two have recently been consolidated with the male high school. The number of pupils enrolled in the public schools in 1873 was 2,070; average attendance, 1,579. For an account of the university of modern languages recently established here, see MASSACHUSETTS, vol. xi., p. 257. A daily, a semi-weekly, and a weekly newspaper

are published. The "Newburyport Herald" was established in 1792. A free library, founded in 1856 by a donation of Josiah Little, contains upward of 15,000 volumes, and is constantly increasing. There are 16 churches, viz.: Baptist, Christian, Congregational (5), Episcopal, Methodist (2), Presbyterian (2), Roman Catholic, Second Advent, Unitarian, and Universalist. — Newburyport was settled about 1635, but until 1764 formed a part of Newbury. It was distinguished for its patriotic spirit during the revolution. The first tea destroyed was in this town, having been taken from a powder house, where it had been deposited for safe keeping, and burned by the citizens in the public square. The first privateer fitted out in the United States was from this port, and the first volunteer company to join the continental army was here formed in response to an appeal of the clergy. On May 31, 1811, a great fire destroyed a large portion of the town and over \$1,000,000 worth of property. In the war of 1812 Newburyport was particularly distinguished for the bravery and success of its privateers. In 1851 a portion of Newbury was annexed to the town, and on May 14 of the same year a city charter was obtained. For the recent discovery of silver in the vicinity, see MASSACHUSETTS, vol. xi., p. 247.

NEW CALABAR. See CALABAR.

NEW CALEDONIA (called *Balade* by the natives), an island of Australasia belonging to France, in the S. Pacific, between lat. 20° and 22° 30' S., and lon. 164° and 167° E.; length from N. W. to S. E. 240 m., average breadth 28 m.; area, 6,769 sq. m.; pop. estimated at from 45,000 to 75,000. It is surrounded by dangerous rocks, sand banks, and coral reefs, and is accessible by only a few channels. It has several bays where ships may anchor near the shore, besides which there are secure harbors

at Port Balade on the N. E. part of the island and Port St. Vincent on the S. W. The interior is occupied principally by barren mountains, rising in some places to a height of about 6,000 ft., and abounding in granite, quartz, mica, steatite, and green amphibole. Coal, nickel, and iron are found; copper is plentiful at Balade; and in 1871 a gold mine was discovered, which soon attracted a number of Australian and Californian diggers. A few fertile valleys are interspersed, in which grow the cocoanut, banana, taro, mango, breadfruit, and yam. The sugar cane is of excellent quality and is much cultivated. There are many large and well watered plains which afford excellent pasturage. Sandal wood was formerly plentiful, but the supply is now nearly exhausted. Tripang is found in the surrounding waters. The natives resemble the Papuan or negro race, and speak a language kindred with the Australian tongues. They belong to different tribes, most of which are described as hospitable and honest. Cannibalism, which formerly existed, has entirely ceased. They are well formed, tall, and robust, but indolent. Their skin is deep black, and their hair coarse and bushy. They are fond of painting their faces, and even in settlements they wear but few garments. Their huts, built of spars and reeds, thatched with bark, and entered by a very small opening, bear some resemblance to beehives. The chief articles of food are yams and fish. — New Caledonia was discovered by Capt. Cook in 1774, and visited by D'Entrecasteaux in 1792. A settlement of Europeans at Balade was attacked by the natives in 1849, and several of the settlers were killed. The same year the captain and cook of the ship *Mary* were killed and eaten. The French took possession of the island in September, 1853, and established on it a station for their Pacific squadron and a



Numea, New Caledonia.

penal colony. In 1870 the number of colonists in the territory subject to the governor of New Caledonia, which also comprises the Loyalty islands and the island of Kunie or Isle des Pins, was 1,562; public functionaries, 289; troops, 754; immigrants, 1,176; non-political convicts, 2,302; political convicts, about

4,000. Numea, on Numea bay, near the S. W. extremity of the island, is the seat of the governor. The French have been repeatedly at war with the islanders, but hostilities were closed in 1857, when the most troublesome chief was made prisoner. French missionaries have made several prosperous settlements, and

cultivate plantations. They have introduced a variety of vegetables and fruits, including wheat and barley, and have been very successful in raising live stock. The number of the islanders who have embraced Christianity is estimated at about 5,000. They are found to be industrious and averse to drunkenness. The imports of the entire dependency were in 1870 valued at 3,249,182 francs, the exports at 203,650. The entrances into the ports were 10 French and 76 foreign vessels, the clearances 10 French and 77 foreign vessels. In 1872 the national assembly of France resolved to deport the communists to the peninsula of Ducos, and to allow them to engage in agriculture. Among them was Rochefort, who escaped in 1874.

NEW CASTLE, a N. county of Delaware, bordering on Pennsylvania, bounded E. by Delaware river and bay, which separate it from New Jersey, and drained by Brandywine, Christina, and other creeks; area, about 500 sq. m.; pop. in 1870, 63,513, of whom 10,192 were colored. It has a diversified surface and fertile soil. It is intersected by the Philadelphia, Wilmington, and Baltimore, the Wilmington and Reading, and the Delaware railroads. The chief productions in 1870 were 504,284 bushels of wheat, 1,002,519 of Indian corn, 353,371 of oats, 200,137 of potatoes, 31,490 tons of hay, 17,555 lbs. of wool, 765,746 of butter, and 4,435 gallons of sorghum molasses. There were 7,464 horses, 883 mules and asses, 11,733 milch cows, 1,364 working oxen, 6,817 other cattle, 5,185 sheep, and 9,988 swine. The number of manufacturing establishments was 459, chiefly in Wilmington, having a capital of \$9,995,175, and an annual product of \$15,093,131. The principal were 26 manufactories of carriages and wagons, 3 of freight and passenger cars, 6 of cotton goods, 1 of gunpowder, 6 of forged and rolled iron, 8 of castings, 18 of leather, 7 of machinery, 2 of matches, 16 of tin, copper, and sheet-iron ware, 7 of woollen goods, 36 flour mills, and 5 ship yards. Capital, New Castle.

NEW CASTLE, a borough and the capital of Lawrence co., Pennsylvania, on the Shenango river, at the mouth of Neshannock creek, 45 m. N. N. W. of Pittsburgh; pop. in 1870, 6,164. It is situated 2 m. above the junction of the Shenango with Mahoning river, on the Beaver and Erie canal, and on the Erie and Pittsburgh, and a branch of the Pittsburgh, Fort Wayne, and Chicago railroad. Its manufactures of iron and glass are extensive. There are also flour mills, three banks, a savings institution, graded public schools, four weekly newspapers, and ten churches.

NEWCASTLE. **I. William Cavendish**, duke of, an English general, born in 1592, died Dec. 25, 1676. He was the nephew of William Cavendish, founder of the ducal house of Devonshire, succeeded in 1617 to large estates, and devoted himself to poetry, music, and other accomplishments. In 1620 he was raised to

the peerage as Baron Ogle and Viscount Mansfield, and in 1628 was created earl of Newcastle-upon-Tyne. At the outbreak of the civil wars he sided with the king, to whose treasury he contributed £10,000, and took the field at the head of 200 cavaliers. He was intrusted with the command of the four northern counties, and raising an army of 10,000 men, he prostrated the power of the parliament in that part of England, defeated Sir Thomas Fairfax at Atherton Moor, June 30, 1643, and was made marquis of Newcastle. Subsequently he held the Scots in check at Durham, but was obliged in April, 1644, in consequence of the defeat of Col. Bellasis at Selby, to throw himself with all his forces into York, where for the next three months he sustained an investment by a greatly superior army under Fairfax. Upon the advance of the royal army under Rupert, he joined the latter with the greater part of the garrison, and endeavored to persuade him that, having raised the siege, he had better defer a battle until the arrival of the reinforcements. His advice was disregarded, and the battle of Marston Moor was fought, which ruined the royal cause in the north. He then forced his way with a few followers to Scarborough, set sail for the continent, and established himself in Antwerp. His estates having been sequestrated by parliament in 1652, he lived in extreme poverty during the protectorate; but on the restoration he received substantial honors, and in March, 1664, was created earl of Ogle and duke of Newcastle. Clarendon says he was "a very fine gentleman, active and full of courage." He was the author of "A New Method to Dress Horses" (published in French, Antwerp, 1658, and in English, with alterations, London, 1667), and of several comedies; and is said to have written the more licentious passages in his wife's comedies. His duchess sketched his character and career in her "Life of the thrice Noble, High, and Puissant Prince William Cavendish, Duke, Marquis, and Earl of Newcastle" (fol., London, 1667). **II. Margaret Cavendish**, duchess of, second wife of the preceding, an English authoress, born at St. Johns, near Colchester, Essex, about 1625, died in December, 1673. She was the youngest daughter of Thomas Lucas, and informs us that "it pleased God to command his servant nature to indue her with a poetical and philosophical genius even from her birth, for she did write some books even in that kind before she was 12 years of age." Joining the court at Oxford in 1643, she was appointed a maid of honor to Queen Henrietta Maria, and accompanied her to Paris, where she met the marquis of Newcastle, whom she married in 1645, and accompanied to Antwerp. At the restoration they returned to England, and the remainder of their lives they spent in retirement, perpetrating an unlimited amount of bad prose and worse poetry. Both in conversation and in print, each spoke of the other as

the greatest genius in the world, the duke being likened by his consort to Julius Cæsar. She was the more voluminous author of the two, nothing being too high or too low for her to attempt; and as she never revised her works "lest it should disturb her following thoughts," she produced 13 folios, 10 of which are in print. Walpole, in his "Catalogue of Royal and Noble Authors," calls her "a fertile pedant, with an unbounded passion for scribbling," and says that she kept a servant who slept on a truckle-bed in her room, and when during the night she felt inspiration, she would cry out, "John, I conceive;" whereupon he would arise and commit to paper what she dictated. The best known of her works are her two volumes of plays. She was buried in Westminster abbey.

NEWCASTLE, or Newcastle-under-Lyme. I. Thomas Holles Pelham, duke of, an English statesman, born in 1693 or 1694, died Nov. 17, 1768. He was the son and successor of Thomas Pelham, first Baron Pelham, and in 1711 came into possession of the large estates of his maternal uncle, John Holles, duke of Newcastle, whose title had expired with him. In 1714 he was created Viscount Haughton and earl of Clare, and in 1715 marquis of Clare and duke of Newcastle-upon-Tyne, with remainder, failing his issue male, to his brother. He entered political life as a whig and a supporter of the house of Hanover, in whose interests he raised a troop of horse to put down the Jacobites. Rewarded for his loyalty by admission into Walpole's ministry as secretary of state, he succeeded by industry, influential connections, and lavish expenditure of money, and also by the assistance of his brother Henry Pelham, in making himself feared and respected by those who despised his abilities, which were beneath mediocrity. He remained in office during the administration of Henry Pelham, and George II. complained that he could not appoint even a page of the back stairs while there were so many of the Newcastle footmen about him. In 1746 the Pelham brothers, apprehensive that the king was endeavoring to bring Lord Granville into power, suddenly resigned office with all their colleagues. An attempt was made to form a new ministry, and at the end of 40 hours the old cabinet was recalled, the king complaining bitterly that a man like Newcastle, who was not fit to be chamberlain to a petty court in Germany, should be forced on him and the nation as a minister. On the death of Henry Pelham in 1754, the duke succeeded to the premiership, but resigned in 1756 from inability to reconcile the discordant elements in his cabinet. In 1757 he was reinstated, with Pitt and Henry Fox as his chief supporters in the ministry, but was so overshadowed by the greatness of Pitt that he sank into insignificance and retired in disgust in May, 1762. In November, 1756, he was created duke of Newcastle-under-Lyme, with special remainder to Henry Fiennes Clinton, ninth

earl of Lincoln, who had married his niece, and who inherited the title in 1768. His administrative incompetency, and the long period (amounting to nearly 40 years) in which he held office, are among the anomalies of British political history. **II. Henry Pelham Fiennes Pelham Clinton**, duke of, a British statesman, born in London, May 22, 1811, died there, Oct. 18, 1864. He entered the house of commons as a conservative in 1832, bearing the courtesy title of Lord Lincoln, and in 1834-'5 was for a few months a lord of the treasury under Sir Robert Peel. He was afterward a prominent and active member of the opposition until Peel's return to power in 1841, when he was made chief commissioner of woods and forests. In 1846 he sustained Peel in his change of views on the corn laws, notwithstanding the desertion of other conservative leaders, and exchanged his office for that of chief secretary for Ireland, in order to secure the indorsement of his large agricultural constituency of South Notts by a new election. He was however defeated there, mainly through the opposition of his father, but was returned from the Falkirk district of burghs. He retired from office with Sir Robert Peel in the summer of 1846, and up to the period of his elevation to the house of lords (Jan. 12, 1851) continued to exercise considerable influence in parliament as one of the leaders of the small but brilliant band of Peelites. In 1853 he became secretary of state for the colonies in the Aberdeen ministry, in which capacity the functions of minister of war devolved upon him. Shortly after the outbreak of the Crimean war the colonial department was separated from that of war; and the duke, choosing the latter, received a share of the blame for the misconduct of military affairs. In January, 1855, he defended himself in the house of lords with great spirit; but the commons having ordered an inquiry, he resigned. He afterward visited the Crimea, and was present at the capture of Sebastopol. In 1859 he became a member of Lord Palmerston's administration as colonial secretary, and held the post till April, 1864. In 1860 he accompanied the prince of Wales on his visit to Canada and the United States. He married in 1832 the only daughter of the duke of Hamilton, from whom he was divorced in 1850. She bore five children, the eldest of whom, Henry Pelham Alexander, born Jan. 25, 1834, succeeded as sixth duke.

NEWCASTLE-UNDER-LYME, a municipal and parliamentary borough and market town of Staffordshire, England, near the right bank of the Trent, 140 m. N. W. of London; pop. in 1871, 15,948. It is well built, paved, and lighted with gas. The principal public edifices are the churches, town hall, literary and scientific institute, theatre, free grammar school (founded in 1602), and a range of almshouses for 20 poor females. It has manufactories of hats, paper, shoes, silks, cotton, and earthenware; coal and iron are mined in the vicinity.

NEWCASTLE-UPON-TYNE (anc. *Pons Ælii*, afterward *Monkchester*), a municipal and parliamentary borough and river port of England, the chief town of Northumberland, on the left bank of the Tyne, 8 m. from its mouth in the North sea, and 250 m. N. N. W. of London; lat. 54° 58' N., lon. 1° 35' W.; pop. in 1871, 128,443. It is built on three steep hills, and extends about 2 m. along the river, communicating with Gateshead on the opposite bank by a handsome stone bridge. A few remains of its ancient fortifications are yet standing. The streets are generally spacious, well paved, and lighted with gas, and many of the buildings are elegant. The old quarters have been largely rebuilt within a few years, and now present some of the finest streets and squares in the kingdom. A handsome edifice was erected in 1859 for public baths and wash houses. The "high level bridge" across the Tyne, built by Robert Stephenson, is supported by six massive piers 124 ft. apart, and has

a carriageway 90 ft. above the river, and over that a railway viaduct at a height of 118 ft. from the water. There are many hospitals, asylums for the deaf and dumb and the blind, learned and scientific societies, and a fine-art institution. The museum of the antiquarian society has the largest collection in England of Roman lapidary inscriptions and sculptures. The old castle, built in 1080 by Robert, eldest son of William the Conqueror, has been recently restored in many parts, and is one of the finest specimens of castellated Norman architecture in the kingdom. A theatre, a music hall, and assembly rooms are the principal places of amusement. There are three daily and five weekly newspapers. The manufactures, which are extensive, are glass of all kinds, iron ware, locomotives, railway and other carriages, paper, copperas, coal pitch, spirits of tar, varnish, soda, whiting, glue, vinegar, and soap. The Elswick iron works, erected in 1859 for the manufacture of the



Newcastle-upon-Tyne.

Armstrong gun, iron bridges, and armor for iron-clad ships, cover an area of 11 acres. Connected with them are shot, shell, and fuze factories, and a mechanics' literary institution for the benefit of the workmen. Ship building is prosecuted on a large scale, and the construction of iron steamships is a prominent branch of industry. The harbor has been much improved by dredging, and there is a fine quay 1,550 ft. long. The traffic is principally in coals (bituminous), for which Newcastle is the greatest mart in the world. The coal trade seems to have been important from the very earliest period of the town; the burgesses obtained from Henry III. in 1239 a license to dig the coals within the borough, and by the time of Edward I. the business had grown to such consequence that Newcastle was able to pay a revenue of £200. In 1615 the trade employed 400 ships, and extended to France and the Netherlands. The exportation of coke is also important, amounting to more than 200,000 tons annually. Lead is shipped

in large quantities; it is brought from Cumberland and the hills of western Northumberland and Durham, and is exported both in pigs and manufactured. This traffic is still more ancient than that in coals. The imports are chiefly agricultural products, wine, spirits, colonial produce, tallow, hides, tar, pitch, lime stone, bones, bristles, rags, oil, and timber. The following statement shows the movement of shipping in the foreign trade for the year ending Jan. 1, 1874:

FLAG.	ENTERED.		CLEARED.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
British	2,667	914,018	4,037	1,581,564
Foreign	2,553	528,068	3,624	862,605
Total	5,225	1,442,081	7,661	2,444,169

Besides the above there is a large number of vessels engaged in the coastwise trade. The total value of foreign and colonial imports in

that year was £5,018,926; the exports of the produce of the United Kingdom amounted to £6,803,819. — Newcastle derived its ancient name of Pons Ælii from a bridge over the Tyne attributed to the emperor Hadrian, and its subsequent one of Monkchester from its monastic establishments. The holy well of Jesus Mound (now called Jesmond), about a mile from the town, was a favorite resort for pilgrims. During the reign of Charles I. the city was taken by the Scottish army under Lesley in 1640, and again in 1644. The borough is governed by a mayor, 14 aldermen, and 45 councillors.

NEWCOMB, Harvey, an American clergyman, born at Thetford, Vt., in 1803, died in Brooklyn, N. Y., Aug. 30, 1863. He removed to western New York in 1818, was a teacher for eight years, and from 1826 to 1831 edited several journals, the last being the "Christian Herald," at Pittsburgh, Pa. For the next ten years he was engaged in writing books for Sabbath schools. He was licensed to preach in 1840, and took charge of a Congregational church at West Roxbury, Mass., and subsequently was pastor in other places. In 1850-'51 he was assistant editor of the New York "Observer," also preaching for some time in Brooklyn, and in 1859 became pastor of a church in Hancock, Pa. He contributed largely to religious journals, and wrote in all 178 volumes, of which 14 are on church history, but most of them are books for children. They include "Young Lady's Guide," "Manners and Customs of the North American Indians" (2 vols.), and "The Cyclopædia of Missions" (1855).

NEWCOMB, Simon, an American astronomer, born at Wallace, Nova Scotia, March 12, 1835. He came to the United States in his youth, taught school several years in Maryland, and was employed as computer on the "Nautical Almanac" for 1857. He began his original investigations in theoretical astronomy in 1858, and in 1861 was appointed professor of mathematics in the navy, and ordered to the naval observatory. He negotiated the contract for the great telescope authorized by congress, supervised its construction, and planned the tower and dome in which it is mounted. He was a member and secretary of the commission created by congress in 1871 to provide for the observation of the transit of Venus, Dec. 9, 1874. The work of organizing parties, selecting their stations, and planning the system of observation fell chiefly on him. In 1872 he was elected a foreign associate of the royal astronomical society of England; and in 1874 he received that society's gold medal for his tables of Neptune and Uranus, and in the same year was elected a corresponding member of the institute of France. His most important astronomical works are: "On the Secular Variations and Mutual Relations of the Orbits of the Asteroids" (1860); "Tables of the Planet Neptune;" "Investigation of the Solar Parallax" (1867); "On the Action of the Planets on the Moon," communicated to the French

academy during a visit to France (1871); and "Tables of Uranus" (1873). He has also published "A Critical Examination of the Financial Policy during the Southern Rebellion" (1865), and has contributed to the "North American Review" and other periodicals articles on political economy, &c.

NEWCOME, William, an English archbishop, born at Abingdon, Berkshire, April 10, 1729, died in Dublin, Jan. 11, 1800. He was educated at Oxford, and distinguished himself as a tutor. He became bishop of Dromore in 1766, of Ossory in 1775, of Waterford in 1779, and archbishop of Armagh in 1795. The most important of his works are: "The Harmony of the Gospels" (1778); "Observations on our Lord's Conduct as a Divine Instructor" (1782); "New Critical Version of the Twelve Minor Prophets and Ezekiel" (1785-'8); "An Historical View of the English Biblical Translations" (1792); and "An Attempt toward Revising our English Translation of the Greek Scriptures" (1796).

NEWELL, Robert Henry, an American humorist, born in New York, Dec. 13, 1836. He was literary editor of the "New York Mercury" from 1858 to 1862, and was employed by the "World" from 1869 to 1874, when he became editor of the "Hearth and Home" weekly journal. He has published, under the pseudonyme "Orpheus C. Kerr," a series of letters on the civil war (4 vols. 12mo, 1862-'8); "The Palace Beautiful and other Poems" (1865); "Avery Glibun," an American romance (1867); "The Cloven Foot," an adaptation of "The Mystery of Edwin Drood" to American scenes and characters (1870); a second volume of poems entitled "Versatilities" (1871); and "The Walking Doll," a humorous novel of New York life (1872).

NEWELL, I. Samuel, an American missionary, born in Durham, Me., July 24, 1784, died in Bombay, India, March 30, 1821. He graduated at Harvard college in 1807, studied theology at Andover, was ordained at Salem, Feb. 5, 1812, and sailed in company with Judson for Calcutta. On his arrival the Bengal government ordered him to leave the country, whereupon he sailed for the Isle of France, thence to Ceylon, and finally in 1817 joined the Rev. Gordon Hall at Bombay. He was one of the signers of the paper which led to the formation of the American board of commissioners for foreign missions. In conjunction with Mr. Hall he wrote "The Conversion of the World, or the Claims of Six Hundred Millions" (Andover, 1818). **II. Harriet Atwood**, wife of the preceding, one of the first female missionaries from the United States, born in Haverhill, Mass., Oct. 10, 1793, died in the Isle of France, Nov. 30, 1812. She was married to Mr. Newell in February, 1812, and accompanied him to India. Her memoirs by her husband, with her letters, and a funeral sermon by Dr. Leonard Woods, have passed through many editions, and have been translated into several languages.

NEW ENGLAND, the N. E. portion of the United States, comprising the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It extends from lat. 41° to $47^{\circ} 32'$ N., and from lon. $66^{\circ} 52'$ to $73^{\circ} 50'$ W., with an area of 68,460 sq. m., and a population in 1870 of 3,487,924. It has a coast line of about 700 m., without allowing for the smaller inlets, and constitutes a large part of the great peninsula which, including Nova Scotia, New Brunswick, and parts of Quebec, Canada, is formed by the Atlantic ocean, the St. Lawrence, and the connected waters of Lakes Champlain and George and the Hudson river. It was originally granted for colonization by James I. in 1606 to the Plymouth company under the name of North Virginia, and received its present name from Capt. John Smith, who in 1614 explored and made a map of the coast. —For the details of the geography and history of New England, see the articles on the states of which it is composed.

NEWFOUNDLAND, a British North American colony, comprising the island of the same name, and the coast of Labrador from Blanc Sablon bay (lat. $51^{\circ} 25'$ N., lon. $57^{\circ} 9'$ W.), at the W. entrance of the strait of Belle Isle, to Cape Chudleigh (lat. $60^{\circ} 37'$ N., lon. 65° W.), at the E. entrance of Hudson strait, a distance of about 750 m. (See LABRADOR.) The island lies at the mouth of the gulf of St. Lawrence, between lat. $46^{\circ} 37'$ and $51^{\circ} 40'$ N., and lon. $52^{\circ} 40'$ and $59^{\circ} 31'$ W., and is separated from Labrador on the northwest by the strait of Belle Isle, 12 m. wide. Cape Ray, its S. W. point, is 65 m. from Cape North, the N. E. point of Cape Breton. Its length N. and S. near the 56th meridian is 325 m., and near the 54th meridian 180 m.; its width varies from about 45 m. N. of the 50th parallel to 310 m. between Cape Ray and St. John's; area, 40,200 sq. m. The portion extending N. from Cape St. John on the N. E. coast around the N. extremity of the island, and thence S. to Cape Ray, a distance of about 450 m., on which the French have the right to fish, is known as the "French shore;" the remainder, from Cape Ray E. and N. to Cape St. John, about 610 m., is divided into 10 districts, embracing 15 electoral divisions (similar to counties), viz.: Bonavista, Burgeo and La Poile, Burin, Conception Bay with five divisions (Bay de Verdes, Carbonear, Harbor Grace, Portdegrave, and Southern), Ferryland, Fortune Bay, Placentia and St. Mary's, St. John's with two divisions (East and West), Trinity, and Twillingate and Fogo. The chief towns are St. John's (pop. in 1869, 22,553), the capital and commercial centre, on the S. E. coast, and Harbor Grace (pop. 6,770) and Carbonear (pop. 5,000), on Conception bay. Other important settlements are Twillingate (pop. 2,790), on Notre Dame bay; Bonavista (pop. 2,600), between Bonavista and Trinity bays; Brigus (2,000), on Conception bay; Greenspond, on Bonavista bay; Catalina and Trinity, on Trinity bay; Bay Roberts, on Conception bay;

Torbay, on the S. E. coast, and Burin, on Placentia bay. The population nowhere extends far inland, and the greater portion of the inhabitants are settled on the peninsula of Avalon and in the adjacent districts at the S. E. extremity of the island. The permanent population in 1763 was about 7,500; in 1804, 20,000; since which it has increased rapidly. The population according to subsequent censuses has been as follows: 1836, 75,096; 1845, 96,606; 1857, 124,288; 1869, 146,536, of whom 75,547 were males and 70,989 females; 1874, 161,455, of whom 8,651 were settled on the French shore, and 2,416 in Labrador. The figures for 1836 and 1845 do not include Labrador and the French shore. The inhabitants are chiefly emigrants or the descendants of emigrants from England and Ireland. The aborigines of Newfoundland, who called themselves Beoths, and painted themselves with red ochre, whence they were called Red Indians, are supposed to have become extinct. There are a few Micmac Indians from New Brunswick in the island.—The interior has never been thoroughly explored. In 1822 W. E. Cormack, a Scotchman, with a single attendant, crossed the island from Trinity bay to St. George's bay, and published a short account of his journey. In 1839 and 1840 a geological reconnoissance of the coast was made by Prof. J. B. Jukes, who in 1843 published a "General Report of the Geological Survey of Newfoundland." For some years past geological and topographical surveys by Alexander Murray have been in progress, and several annual reports have been made to the colonial government. The island is rugged and for the most part barren. The interior is an undulating plateau, interspersed at intervals of a few miles with low hills or ridges, marshes, and lakes. The principal ranges of hills are the Long Range mountains, which run in a N. E. direction from Cape Ray to the Humber river, by which they are cut, and thence N. to Bonne bay, and onward through the centre of the N. peninsula to Castor river; the Cape Anguille mountains, a triangular range near that cape, rising to a height of 1,200 ft. or upward; the Blow-me-down (properly Blomidon) hills, between St. George's bay and the Humber arm, attaining near the latter an elevation of 2,085 ft.; a range crossing the river Exploits, about 30 m. from its mouth, which at the north rises to a summit called Hodge's hill, and S. of the river is known as the Shutebrook hills; a range running N. E. and S. W., and dividing the waters of Gander bay from those of the bay of Exploits, which at the north, where it attains a height of nearly 1,000 ft., is called the Blue hills, and at the south Heart ridge; a range bordering the W. shore of Placentia bay, and extending to Bonavista bay, which is more than 1,000 ft. high; and two ranges in the peninsula of Avalon. The easternmost of these, which probably does not rise above 700 ft., is flanked by two conical hills, called "But-

terpots," about 20 m. apart, which are about 1,000 ft. in height; the western range attains in one of its peaks an elevation of about 1,400 ft. E. and N. E. of the valley of Bay East river are three hills, called "Tolts," which are probably more than 2,000 ft. high, the southern of which is named Mount Sylvester. The coast is for the most part precipitous and lofty, and is broken into numerous headlands and peninsulas by deep bays, which in turn are indented by innumerable smaller inlets. The sinuities measure several thousand miles. The W. coast is the most regular. The principal bays are Pistolet, at the N. extremity; Hare, Canada, White, Notre Dame, and the bay of Exploits, on the N. E. coast; Bonavista, Trinity, and Conception, on the E.; Trepassey, St. Mary's, Placentia, Fortune, Hermitage, and D'Espoir (called by many of the inhabitants Despair bay), on the S.; and St. George's bay, bay of Islands, Bonne bay, and St. John's bay, on the W. coast. Between White bay on the east and the gulf of St. Lawrence and strait of Belle Isle on the west the N. projection of the island forms an extensive peninsula. The peninsula of Avalon forms the S. E. extremity, and is connected with the mainland by an isthmus 3 m. wide, which separates Trinity bay N. E. from Placentia bay S. W. Between Placentia and Fortune bays is the peninsula of Burin. The most important capes are Cape Bauld, at the N. E. extremity of the island; Partridge point, at the entrance of White bay; Cape St. John, at the N. entrance of Notre Dame bay; Cape Freels at the N., and Cape Bonavista at the S. entrance of Bonavista bay; Cape St. Francis, at the S. entrance of Conception bay; Cape Race, at the S. E. extremity of the island; Cape Ray, at the S. W. point; Cape Anguille at the S. and Cape St. George at the N. entrance of St. George's bay; Point Riche, on the N. portion of the W. coast; and Cape Norman, at the N. W. extremity. At the most important and frequented points along the coast light-houses have been erected. There are numerous good harbors, but the entrance to many of them is obstructed by rocky ledges. Small islands abound in the bays and along the coast. The most important are Belle Isle, at the entrance to the strait of that name; Quirpon island, at the N. E. extremity; Groais, South Belle Isle, and St. Barbe or Horse island, off the N. E. coast; Twillingate and New World islands, in the bay of Exploits; Fogo island, E. of these; Random, in Trinity bay; Marasheen, in Placentia bay; and Brunet, in Fortune bay. The Miquelon islands and St. Pierre, off the extremity of the peninsula of Burin, which belong geographically to Newfoundland, are subject to France. The interior of the island is so thickly strewn with lakes and ponds that it is estimated that a third of the surface is covered with water. The most extensive lakes are Grand pond, about 15 m. N. E. of the head of St. George's bay, 50 m. long by 5 m. wide; Red Indian pond, 33

by 3 m.; Gander pond, W. of Bonavista bay, 30 by 2 m.; Terra Nova lake, 4 m. long by 2½ m. wide, discharging through the river of the same name into Bonavista bay; and George the Fourth's, Jameson, and Bathurst lakes, in the S. part of the island, whose position and size have not been accurately ascertained. The principal rivers are the river of Exploits, which flows from Red Indian pond, and after a N. E. course of 70 m. falls into the bay of Exploits; Terra Nova, about 100 m. long; Bay East, which flows into D'Espoir bay; Great and Little Codroy rivers, which empty into the gulf of St. Lawrence between Capes Ray and Anguille; and Humber, which discharges the waters of Grand pond, and after expanding into Deer lake falls into the Humber arm, an inlet of the bay of Islands. The Exploits, Humber, Terra Nova, and some other streams are navigable by canoes or flats.—All the great ancient rock systems between the lower Laurentian and the coal measures are more or less represented in different parts of Newfoundland. The series in descending order is as follows: carboniferous, Devonian, upper Silurian, lower Silurian, primordial Silurian, Huronian or Cambrian, upper Laurentian, and lower Laurentian. The lowest of these systems appears to constitute the principal mountain ranges, coming to the surface through the more recent deposits on the axes of anticlinal lines, or brought out by great dislocations, most of which are nearly parallel with each other in a general bearing of N. N. E. and S. S. W. This regularity of bearing explains the uniform N. E. and S. W. direction of the bays and of the principal lakes and streams. The Laurentian gneiss forms the Long Range, and is exhibited in the ranges in the S. W. portion of the island. A granitic and gneissoid belt stretches from the head of Placentia bay to Bonavista bay, and thence along the W. and N. shore of the latter to Cape Freels. The gneiss is also developed in the island of Fogo, and forms the nucleus of the S. E. extremity of the peninsula of Avalon. On the W. flank of the Long Range, on the upper part of Great Codroy river, large fragments of white crystalline limestone with graphite are found, and toward the northeast on the same range occur labradorite and other crystalline rocks, with masses of magnetic iron. In the peninsula of Avalon the crystalline rocks of the Laurentian period are succeeded by a set of slates, with conglomerate bands, diorites, quartzites, and alternating green and reddish, hard silicious and felsite slates, surmounted by a great mass of thick-bedded green and red sandstone, the latter passing into a moderately coarse conglomerate, with many pebbles of red jasper at the top. These occupy the greater portion of the peninsula. The calciferous formation yields fossils on Canada and Hare bays, and appears along the W. coast N. of St. George's bay. Rocks of upper or middle Silurian age are indicated by the presence of the characteristic fossils on White and Exploits bays. The carbon-

iferous series occupies a large area in the vicinity of Grand pond and on St. George's bay. Building stones, including granite, sandstone, and limestone, are abundant in the island. Marble of various kinds occurs on the bay of Islands, and the fossiliferous limestone of Topsail head on Conception bay takes a high polish, and furnishes a handsome variegated marble. Gypsum abounds in the vicinity of the Codroy rivers and elsewhere in the S. W. part of the island, and bituminous coal is found in the carboniferous formation, where also brine springs frequently occur. Iron ore has been found. A lead mine was for some time worked at La Manche, at the head of Placentia bay, but with little success, though the lode is very promising. Copper mines have been opened at several points, but, with the exception of that at Tilt Cove on Notre Dame bay, they have nearly all been discontinued. The Tilt Cove mine has been in successful operation since 1865, and in the five years from 1869 to 1873 inclusive 22,404 tons of ore were exported. A vein of nickel has been discovered here, and a small quantity of ore has been extracted.—The climate, tempered on the one hand by the Gulf stream and on the other by the arctic current, is neither so cold in winter nor so hot in summer as on the adjacent portions of the continent. The weather is extremely variable, being often very mild in midwinter, and on the other hand raw and cold in midsummer. Spring is the most disagreeable and trying season, owing probably to the large floes of ice brought down from the north, and to the breaking up of the ice in the gulf of St. Lawrence, which affects the climate of the S. and W. portion of the island. The W. coast has a milder climate than the E. Dense fogs are prevalent, principally in summer, along the S. and S. W. shores of the island and the coast of the peninsula of Avalon, but they do not extend far inland. The N. portion of the island is said to be quite free from them. The fogs and violent gales, which are common, render the coast of Newfoundland dangerous to navigation. The prevailing winds vary from S. W. to W., N. W., and N., except in February and March, and sometimes April, when N. E. winds prevail. The climate, except for those suffering from pulmonary diseases, is very healthy. The mean temperature at St. John's for the eight years from 1857 to 1864 inclusive was $41\frac{1}{4}^{\circ}$, the highest annual mean being 44° in 1863, and the lowest 37° in 1864; average annual fall of rain and melted snow, 59.94 inches, the greatest fall being 82.4 inches in 1860 and the least 42 in 1857. The highest temperature observed was 89° in July, 1857, and the lowest -14° in February, 1863.—In the interior, so far as known, the summits and sometimes the sides of the hills and ridges are thinly covered with a stunted vegetation, consisting of berry plants and dwarf bushes of various species, and are called "the barrens." The sides of those hills that afford natural drainage and the borders of the lakes and riv-

ers are clothed with forests, consisting chiefly of fir, birch, pine, juniper, larch, wych hazel or yellow birch, mountain ash, alder, aspen, and spruce. These trees are generally small and stunted, though the fir and birch sometimes attain considerable size. The largest and best timber is in the valleys of the Humber, the Exploits, the Gander, and the Gambo (the last two S. of the Exploits), where the pine and spruce are of the finest description. All the best timber and the best land are back from the coast. The ground here is often covered with a creeping bush, a species of yew, called in Canada the ground hemlock. The frequent peat marshes are covered with grasses, rushes, &c., while the other valleys and level tracks produce abundant pasturage. Much of the country is covered with lichens and reindeer moss.—Large portions of the island are believed to be adapted to grazing, but few domestic animals are kept. Sheep raising has been retarded by the great number of dogs kept by the inhabitants. Agriculture has been but little attempted, and chiefly in the southeast, where the soil and climate are least favorable. There is much arable land about the heads of the bays, on Humber river, the river of Exploits, and other streams. The region about the bay of Islands and along the W. coast S. of it has been found to contain extensive fertile tracts, and the climate here is better adapted to agriculture than on the S. and E. coasts. The interior is believed to contain much arable land, and the marshes are thought to be in large measure reclaimable. The principal crops that may be successfully cultivated are barley, oats, potatoes, turnips, cabbages, peas, beans, carrots, &c. Wheat will ripen in some places; its cultivation has been attempted only on the smallest possible scale. Hops thrive, and strawberries, currants, gooseberries, cherries, &c., grow in the gardens, while numerous species of berries are found wild. The number of acres under cultivation in 1869 was 41,715. During the last two or three years, with successful fishing seasons, considerable progress has been made in agriculture.—The principal wild animals are the caribou, bear, wolf, hare, beaver, marten, wild cat, and fox. The Newfoundland dog, so famous for its size, sagacity, and fidelity, is now rarely found of pure blood, the animals commonly known by the name being crosses of innumerable varieties. Land and aquatic birds abound. The adjacent waters swarm with cod, caplin, herring, seals, &c., and salmon were formerly abundant in the streams. The fisheries are the chief wealth of the colony, employing directly or indirectly nine tenths of the inhabitants. The number of fishermen is about 32,000. The principal fisheries, in the order of importance, are the cod, seal, herring, and salmon. The cod fishery is pursued around the shores of the island and on the coast of Labrador, from June to October; the average annual catch is about 1,500,000 quintals. The seal fishery begins about the first of March and terminates in May.

In 1873, 107 vessels, with an aggregate tonnage of 15,080 and 8,062 men, of which 20, of 5,766 tons and 3,595 men, were steamers, were engaged in it, and about 525,000 seals were taken. The chief seats of the herring fishery are Labrador, Bonne bay, bay of Islands, St. George's bay, and Fortune bay. In the bay of Islands it is pursued during the winter. The average catch is about 175,000 barrels. The salmon fishery is prosecuted to some extent in Labrador, but chiefly in the bays on the E. coast of the island; the average quantity taken annually is about 6,500 tierces. (See FISH-ERIES, and SEAL FISHERY.) Newfoundland has scarcely any manufactures, excepting a few establishments at St. John's. Its commerce is important. The value of imports and exports at different periods has been as follows:

YEARS.	Imports.	Exports.
1834	£618,757	£826,659
1854	964,527	1,019,572
1864	1,067,062	1,111,380
1870	1,386,635	1,297,974
1871	1, 58,172	1,810,892
1872	1,399,180	1,188,958
1873	1,409,730	1,858,498
1874	1,532,227	1,528,841

The principal countries with which the commerce is carried on are the United Kingdom (imports from in 1873, £505,708; exports to, £450,424), Canada (imports, £377,732; exports, £74,174), British West Indies (imports, £46,388; exports, £60,063), Spain (exports, £217,454), Portugal (exports, £180,624), Italy (exports, £32,608), United States (imports, £355,253; exports, £44,479), French West Indies (imports, £57,196; exports, £29,544), and Brazil (exports, £244,413). The principal articles of import in 1873 were flour, meal, and hard bread (£380,568), manufactured goods (£259,061), meats (£120,218), molasses (£80,552), leather and leather ware (£74,303), earthen, glass, and hardware (£59,153), butter and cheese (£58,498), besides cordage and cables, coal, fishing tackle, salt, sugar, tea and coffee, tobacco and cigars, wood and wooden ware, wines, spirits, &c. The preceding statements relate only to the island of Newfoundland, exclusive of the French shore. The exports in 1873 from the entire colony, including Labrador and the French shore, were as follows:

ARTICLES.	Quantity.	Value.
Dried codfish	1,316,845 qtls.	£1,065,159
Salmon	7,304 tierces.	27,065
Herring	138,937 bbls.	64,549
Other fish .....	.....	4,860
Cod oil, crude	1,049,580 gals.	121,479
“ “ refined	97,272 “	16,485
Seal oil	1,571,220 “	168,865
Other fish oil	57,204 “	2,659
Seal skins	452,587	101,525
Copper ore	5,553 tons.	40,492
Nickel ore	120 “	750
Other articles .....	.....	17,698
Total .....	.....	£1,631,086

The number of vessels entered at the various ports in 1873 was 1,146, with an aggregate tonnage of 218,122; cleared, 937, tonnage 193,902; belonging in the colony, 1,301, tonnage 68,185. —There are no railroads in Newfoundland, and the means of communication by land are imperfect. Steamers ply between the principal settlements and St. John's. Transatlantic steamers touch at St. John's semi-monthly for nine months, and monthly during the three winter months. The most important places are connected with St. John's by telegraph, and the island, as the nearest point of North America to Europe, occupies a prominent position as the centre of telegraphic communication between the two continents. The New York, Newfoundland, and London telegraph company, incorporated in 1854, has the monopoly of landing cables, and has associated with itself in the privilege the Atlantic and French cable companies. The colony has since April 15, 1874, the right under the charter of purchasing the interests of the company, and the policy of exercising the right has been much discussed. There are two banks at St. John's, with a capital of £50,000 each; aggregate assets, May 31, 1873, £739,111; average circulation of notes, £189,098; of specie, £76,614. There is also a savings bank at St. John's, with a branch at Harbor Grace, having together at the above date 2,102 depositors, and deposits to the amount of £189,281.—The executive power is vested in a governor, appointed by the crown during pleasure, and an executive council of not more than seven members, appointed by the governor, and responsible to the assembly. The legislative power is vested in a legislative council of not more than 15 members (present number 13), appointed by the crown or governor during pleasure, and a house of assembly of 31 members, elected by the people for four years, unless sooner dissolved by the governor. The right of suffrage is conferred upon all male subjects of Great Britain, 21 years old and upward, who have occupied a dwelling house as owners or tenants for two years immediately preceding the day of election. Voting is *viva voce*. The number of registered electors at the election of 1873 was 20,759. The legislature meets annually at the end of January or the beginning of February. The supreme court consists of a chief justice and two assistant judges, each of whom holds a circuit court in one of the three circuits, northern, central, and southern. The vice-admiralty court is held by the chief justice. A court of civil and criminal jurisdiction, with summary process, is held in summer on the Labrador coast by a single judge, who passes from point to point in a revenue cruiser. There are also minor courts and justices of the peace. Judges and justices of the peace are appointed by the governor during pleasure. The revenue of the colony is derived exclusively from a tariff on imports. There is no municipal or other body authorized to levy

taxes or lay assessments. The only direct taxation is a land tax or ground rent for sewerage and a house or tenant tax for the supply of water in St. John's, levied under acts of the legislature. The revenue in 1874 amounted to £185,334, the expenditures to £198,290, the difference being partly made up by the excess of revenue in previous years, there being a balance of £3,300 in favor of the colony at the close of 1873. The public debt on Dec. 31, 1874, was £239,396. The penitentiary is at St. John's, where there is also a lunatic asylum. For school purposes the island is divided into districts, and in each a board of education consisting of Catholics for the Catholic schools, and another consisting of Protestants for the Protestant schools, are appointed by the governor in council. These boards have the general management of the schools in their respective districts, subject to the approval of the governor in council. The governor with the advice of the council also appoints a Catholic and a Protestant inspector, to inspect the schools and report upon their condition. The sum of £750 (£400 for Protestants and £350 for Catholics) is appropriated annually for the training of teachers. Two scholars from each electoral division are entitled to £25 each for their board, lodging, and tuition in one of the academies or higher schools of the island. The money appropriated by the legislature for educational purposes has hitherto been divided between the Protestants and Catholics in proportion to their numbers; the act of April 29, 1874, provides for a further division among the various Protestant sects. This act does not go into effect until July 1, 1875, after a census has been taken, upon which and subsequent decennial censuses the denominational appropriations are to be based. It increases the number of inspectors to three. In the schools under government control a small tuition fee is required of pupils able to pay. Besides those established by the governmental boards, the schools of the colonial church and school society (an English association, under the auspices of the established church), and several established and controlled by the different religious denominations, receive aid from the government. The amount expended for educational purposes in 1872 was £14,852; in 1873, £15,316. The number of schools in operation in 1874 was 293, with a total attendance of 13,597 pupils, of which 157 with 7,805 pupils were Protestant, and 136 with 5,792 pupils Catholic. Besides these there are grammar schools at Harbor Grace and Carbonear, an Episcopal, a Wesleyan Methodist, and a general Protestant academy at St. John's, and at the same place an Episcopal theological institute and St. Bonaventure college (Catholic). There are 13 newspapers published in the island, viz.: 1 tri-weekly, 5 semi-weekly, 5 weekly, and 2 bi-weekly, all issued at St. John's, except one weekly at Harbor Grace. Newfoundland contains two Roman Catholic bishoprics, St. John's

and Harbor Grace, two Wesleyan Methodist superintendencies, and an Episcopal bishopric, with a bishop and a coadjutor. In 1874 there were 64,486 Roman Catholics, 59,605 Episcopalians, 35,551 Wesleyan Methodists, and 1,813 of other sects. The number of places of worship in 1869 was 188, viz.: Episcopal, 81; Catholic, 59; Wesleyan Methodist, 42; other, 6.—Newfoundland was discovered by John or Sebastian Cabot in 1497 or 1498. Within a few years the island was frequented by the Portuguese, Spanish, and French for its fisheries, and subsequently by the English. On Aug. 5, 1583, Sir Humphrey Gilbert, in command of four armed vessels, entered the harbor of St. John's and took formal possession of the island in the name of Queen Elizabeth. Among the earliest attempts at settlement was that of Mr. Guy, a Bristol merchant, in 1610, who founded a colony at Mosquito cove in Conception bay, which remained but a short time. In 1614 Capt. Richard Whitburn, of Exmouth in Devon, was sent by the admiralty to Newfoundland to establish order among the fishermen and correct the great abuses that prevailed. He made an attempt to impanel juries in the most frequented harbors, and was the first to introduce the forms of law in Newfoundland. A year or two after he was appointed governor of a colony of Welshmen, established by Dr. William Vaughan in the southern part of the island, at a place now known as Little Britain. About this time fixed habitations were erected by the fishermen at various points along the coast. What may be considered the first permanent colony was established by Sir George Calvert, afterward Lord Baltimore, on the S. E. peninsula, to which he gave the name of Avalon, probably in 1623, though some authorities say in 1621. About 10 years after this some colonists from Ireland came over under Lord Falkland, and a party of English under Sir David Kirk in 1654, about which time 15 settlements, comprising 300 families, had been made. About 1620 the French had established a station at Placentia. In 1633 Charles I. established a code of regulations, but the island still continued without a regular government. In the reign of William III. the three fishing captains first arriving in any harbor each summer were designated admiral, vice admiral, and rear admiral respectively of that harbor, and became magistrates, empowered to decide all fishery rights and civil causes. Until the peace of Utrecht in 1713 the ports were frequently the scenes of warfare between the English and French, one and the other power alternately gaining possession of them. The English government was also opposed to the settlement of their own people, and broke up their establishments on the ground of their being likely to monopolize the fishery, and prevent it from becoming a nursery for British seamen. The treaty of Utrecht gave Great Britain the sole sovereignty of the island, but

NEW HAMPSHIRE

Scale of Miles

0 5 10 15 20 25 30 35

County Towns

Railroads

This type indicates a population of 2,000 or over.



permitted the French to catch and dry fish on the shores from Cape Bonavista N. around the N. point of the island, and thence S. to Point Riche. The present limits of the French shore were defined by the treaty of 1783. In 1728 a governor was first appointed, but he was for a time almost powerless, being opposed by the fishing admirals. For many years the only law was the proclamations of the governors. In 1750 a court of oyer and terminer was established. For some years prior to 1767 Capt. Cook, the famous navigator, was engaged in surveying the coast. His charts are still in use, being among the best and in some cases the only trustworthy ones. Newfoundland suffered severely from the non-intercourse act passed by the first provincial congress and carried out in 1775. Dependent upon New England for supplies to the annual value of nearly £350,000, when these were suddenly cut off and the coast and harbors were ravaged by American privateers, the inhabitants were reduced to the greatest distress before they could be relieved by the protective measures of the mother country. In 1792 the supreme court was established. In 1805 the first post office was established at St. John's, and in 1806 the first newspaper was published there. In 1832 a representative assembly was granted to the island. The present form of government was organized in 1855. In 1856 Newfoundland was connected by a telegraphic cable with the American continent, and in 1866 the first Atlantic cable furnishing permanent communication with Europe was landed. The question of joining the Dominion of Canada as a province has several times come before the people at elections for members of assembly, but the proposition has been voted down. Labrador, with Anticosti and the Magdalen islands, was annexed to Newfoundland in 1763, but in 1774 they were placed under the government of Lower Canada. In 1809 Labrador and Anticosti were reannexed to Newfoundland. In 1825 Anticosti, with the portion of Labrador W. of Blanc Sablon bay, was again transferred to Lower Canada. Difficulties have at various times occurred between the French and the colonists regarding their respective rights on the French shore, which have retarded the development of that portion of the island, the French claiming the exclusive right of fishery and that the English have no right to form permanent settlements there.—See "History of Newfoundland," by L. A. Anspach (London, 1819), and by the Rev. Charles Pedley (London, 1863).

NEWFOUNDLAND DOG. See DOG, vol. vi., p. 180.

NEW GRANADA. See COLOMBIA.

NEW GUINEA. See PAPUA.

NEW HAMPSHIRE, one of the thirteen original states of the American Union, bounded N. by the province of Quebec, Canada, E. by Maine and the Atlantic, S. by Massachusetts, and W. by Vermont, from which it is separated by the

west bank of Connecticut river. It is situated between lat. 42° 40' and 45° 18' N., and lon. 70° 37' and 72° 37' W.; length from N. to S. about 180 m., extreme breadth 93 m., average breadth 50 m.; area, according to the late state survey, 9,392 sq. m. The state is divided into 10 coun-



Seal of the State of New Hampshire.

ties, viz.: Belknap, Carroll, Cheshire, Coös, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan. According to the census of 1870, the cities were: Concord, the capital, containing 12,241 inhabitants; Dover, 9,294; Manchester, 23,586; Nashua, 10,543; and Portsmouth, 9,211. Among the more important towns are Claremont, 4,053; Exeter, 3,437; Farmington, 2,063; Franklin, 2,301; Gilford, 3,361; Hanover, the seat of Dartmouth college, 2,085; Haverhill, 2,271; Keene (made a city in 1874), 5,971; Laconia, 2,309; Lancaster, 2,248; Lebanon, 3,094; Littleton, 2,446; Milford, 2,606; Newport, 2,163; Pembroke, 2,518; Peterborough, 2,236; Rochester, 4,103; Somersworth, 4,504; Weare, 2,092; and Winchester, 2,097. The original population of New Hampshire was almost exclusively of English and Scotch descent, and the rural districts still remain without much intermixture. The population of the state and its rank in the Union, according to the national enumerations, have been as follows:

YEARS.	White.	Colored.	Total.	Rank.
1790	141,097	788	141,885	10
1800	162,998	860	163,858	11
1810	213,490	970	214,460	16
1820	243,236	786	244,022	15
1830	268,721	607	269,328	18
1840	284,036	538	284,574	22
1850	317,456	520	317,976	22
1860	325,579	494	326,073	27
1870	317,637	580	318,200	31

Of the total population in 1870, which included 23 Indians, 155,640 were males and 162,660 females; 288,689 were native born, of whom 242,374 were born in the state, 11,404 in Maine, 16,510 in Massachusetts, and 12,837 in Vermont; and 29,611 were of foreign birth,

including 12,955 born in British America, 2,679 in England, and 12,190 in Ireland. The density of population was 34.3 persons to a square mile. There were 72,144 families, with an average of 4.41 persons to each, and 67,046 dwellings, with an average of 4.75 to each. From 1860 to 1870 there was a decrease of 2.38 per cent. in the population, this being the only state except Maine in which there was not an increase. The number of male citizens 21 years old and upward was 83,361. There were in the state 78,766 persons between the ages of 5 and 18 years; the total number attending school was 65,824. There were 7,618 10 years old and over unable to read, and 9,926 unable to write. Of the latter 1,992 were native and 7,934 foreign born; 7,656 were 21 years of age and upward, including 4,257 males. The number of paupers supported during the year ending June 1, 1870, was 2,636, at a cost of \$235,126. Of the total number (2,129) receiving support June 1, 1870, 1,754 were of native and 375 of foreign birth. The number of persons convicted of crime during the year was 182; in prison June 1, 1870, 267, of whom 201 were native and 66 foreign. The state contained 206 blind, 170 deaf and dumb, 548 insane, and 325 idiotic. Of the total population 10 years of age and over (260,426), there were engaged in all occupations 120,168; in agriculture, 46,573, of whom 15,666 were laborers and 30,749 farmers; in professional and personal services, 18,528, including 664 clergymen, 7,481 domestic servants, 4,686 laborers, 349 lawyers, 565 physicians and surgeons, and 1,987 teachers; in trade and transportation, 8,514; and in manufactures and mechanical and mining industries, 46,553. The total number of deaths was 4,291, or 1.35 per cent. of the population. There were 953 deaths from consumption, there being 4.5 deaths from all causes to one from that disease, which was a greater ratio of deaths from consumption than in any other state; from pneumonia, 364 deaths, there being 11.8 deaths from all causes to one from that disease; cholera infantum, 139; diphtheria and scarlet fever, 147; enteric fever, 302; and diarrhoea, dysentery, and enteritis, 177. —New Hampshire has but 18 m. of seacoast, and the shore in most places is a sandy beach, bordered with salt marshes. There are numerous creeks and coves, which form harbors for small craft; but Portsmouth, at the mouth of the Piscataqua, is the only haven for large ships. The great feature in the topography is a mountainous ridge extending through the state in a direction E. of N. and parallel to the western border. West of this lies the Connecticut river basin; to the east the valleys of the Androscoggin, Saco, and Merrimack rivers. From the Massachusetts line to Warren in Grafton co., 80 m., the height of this ridge averages 1,500 ft., the most prominent mountains being, according to the recent survey by Prof. Hitchcock, Monadnock, 3,186; Sunapee, 2,683;

Smart's, 2,500; Cuba, 2,927; and Piermont, 2,500. Between Warren and Randolph in Coös co., 40 m., the height of the ridge averages 4,000 ft., as it consists of the main line of the White mountains, the most prominent mountains being Moosilauke, 4,811 ft.; Blue, 4,370; Kinsman, 4,200; Lafayette, 5,259; Haystack, 4,500; Twins, 4,920; Field, 4,070; Webster, 4,000; Jackson, 4,100; Clinton, 4,320; Pleasant, 4,764; Franklin, 4,904; Monroe, 5,384; Washington, 6,293; Clay, 5,553; Jefferson, 5,714; Adams, 5,794; and Madison, 5,365. The lowest gaps in this section are the Woodstock notch, 1,655 ft.; Franconia notch, 2,014; Pinkham notch, 2,018; White Mountain notch, 1,914; and Dixville notch, 1,831. The height of the remaining portion averages 2,000 ft., the highest points being Randolph, 3,043; peak in Erving's Location, 3,156; Pisgah, 2,897; Carmel, 3,711; and the highest elevation along the northern boundary, 2,917 ft. The lowest gaps along the whole line are at the Orange summit of the Northern railroad, 990 ft.; at the Warren summit of the Boston, Concord, and Montreal railroad, 1,063; at the Milan summit of the Grand Trunk railroad, 1,087; at the Newbury summit of Concord and Claremont railroad, 1,161; and at the summits of proposed railroads in Harrisville and Stoddard, 1,265 and 1,560. The country S. of the White mountains and E. of the great watershed is mostly below 600 ft., save a few peaks like Kearsarge, 2,943, Gunstock, 2,394, Croteched, 2,066, Great Moose, 1,404, and Crople Crown, 2,100. The average elevation of the whole state is 1,200 ft. Considering the whole area of the state, there is one peak over 6,000 ft., 8 between 5,000 and 6,000, 14 between 4,500 and 5,000, 20 between 4,000 and 4,500, 28 between 3,000 and 4,000, and nearly 40 between 2,000 and 3,000. The White mountains cover an area of 1,270 sq. m. The general slope of the country is from N. to S. With the exception of Niagara falls, the mountain scenery of New Hampshire attracts more tourists than any other natural object in the United States. (See WHITE MOUNTAINS.) —The Connecticut river, which is the largest stream, rises near the N. extremity, and with Hall's stream forms the W. boundary; the chief tributaries which it receives from this state are Hall's, Indian, and Perry streams, and the Upper Ammonoosuck in the north, and the Sugar, Cold, Ashuelot, Mohawk, Israel's, John's, Lower Ammonoosuck, Oliverion, and Mascema in the south. The Merrimack is formed by the junction of the Pemigewasset, which rises in the Franconia mountains, and the Winnipiseogee, the outlet of the lake of the same name, at Franklin, and runs S. through the middle of the state to Massachusetts. Baker's river, rising near Moosilauke mountain, unites with the Pemigewasset at Plymouth. Other important tributaries are the Newfound, Contoocook, Piscataquog, Souhegan, and Nashua rivers on the west, and the Soucook and Suncook on the east. The Piscataqua river is formed by a

union of the Salmon Falls and Cochecho rivers and Great bay at Dover point, draining nearly one eleventh of the area of the state; and the Piscataqua and Salmon Falls rivers constitute part of the boundary line between Maine and New Hampshire. Great bay, a tidal basin containing an area of about 9 sq. m., extends to Exeter, and receives the waters of the Belknap, Lamprey, Oyster, Squamscot, and Winnicut rivers. The Piscataqua river from Dover point to Portsmouth is deep and about half a mile wide. Through its channel Great bay discharges its waters at ebb tide with such swiftness that Portsmouth harbor has never been known to freeze over. It is one of the most secure and commodious harbors on the coast, into which ships of the largest capacity can enter. The Merrimack and its branches, and the Salmon Falls, have numerous cataracts, furnishing a large amount of water power to manufacturing towns. The Androscoggin has a small part of its course in the N. E. part of this state, and the Saco has also its source among the White mountains, and runs S. E. into Maine. The Saco near its head waters passes through the celebrated notch, a remarkable chasm 2 m. long, and where narrowest only 22 ft. wide. The Margalloway, which falls into Lake Umbagog, has part of its course in New Hampshire. About one sixteenth of the surface of this state is covered with water, embracing about 1,500 streams and numerous lakes and ponds. Winnipiseogee is the largest and most beautiful lake; it is about 25 m. long by from 1 to 10 broad, with an area of nearly 72 sq. m., and contains 267 islands, and its shores are indented with numerous bays. Umbagog lake, about 10 m. long and 5 broad, on the boundary between Maine and New Hampshire, is one of the sources of the Androscoggin; four Connecticut lakes, the source of the river of the same name, are in the north; and Mascoma, Newfound, Ossipee, Sunapee, and Squam lakes, and several smaller bodies of water, are the sources and recipients of many streams.—The rocks of New Hampshire are chiefly eozeic, belonging to the Laurentian, Atlantic, Labradorian, and Huronian, as defined by the state geologist. Small areas of Cambrian slates and larger ones of supposed Helderberg occur in the W. and S. W. portions of the state. Lithologically the rocks are gneiss, granite, felsite, ossipyte, andalusite gneiss and schists, mica, talcose, hydro-mica, and hornblende schists, clay slates, limestones, and quartzites. The most recent investigations indicate the existence of no good reasons for regarding the New Hampshire formations as altered palæozoic. Not much has been done in the working of metallic ores. Iron has been mined at Franconia and Bartlett, and there are smaller veins at Landaff, Piermont, and Gilford. The ores are magnetic and specular. A blast furnace has been erected at Franconia, but the amount of pig thus far produced has been small, and the works have been aban-

doned. Copper, zinc, and lead ores, most of the last argentiferous, are found in a large number of towns. In Madison a galena rich in silver has been worked extensively. A lead mine, largely argentiferous, and containing also a considerable quantity of copper, is successfully worked in Warren. Large deposits of copper sulphuret exist in Gardner's mountain, in Lyman and Monroe. Pyrites is abundant in Hanover, Lebanon, Croydon, and Unity, suitable for the manufacture of sulphuric acid. A vein containing oxide of tin in small quantity, and associated with arsenic, occurs in the town of Jackson. Gold is mined from the quartz in Lisbon, where are the quartz mills; two companies are at work, and since the beginning of operations about \$30,000 worth of gold has been sold to the United States mint. Granular quartz has been worked in the towns of Unity and Keene, and applied to a variety of purposes. It is ground between millstones and bolted, to be used either as a polishing powder or for the preparation of sand paper at the manufactory of that article in Rockingham, Vt. It has also been mixed instead of barytes with white lead. The quartz of Lyndeborough is used in the manufacture of glass. Acworth, near Bellows Falls, is celebrated for its beryls, gigantic specimens of which are found in the collections of minerals throughout Europe. Tourmalines and mica are also found in great perfection. The latter is extensively quarried at Alstead, a few miles S. of Acworth, and at Grafton, 35 m. N. It is sold at from \$2 to \$3 a pound, to be used for the windows in stoves, for lanterns, compass cards, &c. Other quarries are in Springfield and Alexandria. Sulphuret of molybdenum is found in many places, especially at Westmoreland; and graphite or plumbago is also a common mineral, which is worked for the manufacture of crucibles at Taunton, Mass. Steatite or soapstone is also found in many localities, as at Orford, Haverhill, Richmond, Weare, Warner, and Keene. It is obtained at the quarry in Francestown in large blocks, which are cut to the dimensions of 6 ft. by 3 and 7 ft. by 5, as well as into slabs and smaller blocks. It is used for stoves, fireplaces, sinks, rollers used in dressing cotton warp, and other purposes. The mills for sawing the stone from Francestown are at Nashua. Granite is extensively quarried at Concord, Plymouth, Hooksett, Manchester, Milford, Fitzwilliam, Roxbury, Troy, Farmington, and Marlborough. The variety known as Concord granite is fine-grained, soft, and well adapted for monuments as well as for buildings, and takes a high rank in the estimation of architects.—The soil of New Hampshire is not generally very fertile, but by industry and skill the inhabitants have in great measure overcome its natural defects. The best lands are in the valleys of the rivers, some of which are subject to occasional overflows. The N. part of the state is chiefly pasture and wood land. The climate is severe,

being somewhat colder than that of Maine, but more steady. Difference of elevation within the state causes great difference in the degree of temperature; so much even as 20° to 25° between the valleys and the more elevated positions. In summer the heat sometimes rises to 100°, and in winter the cold has been known to freeze the mercury in the thermometer. In the neighborhood of the White mountains the winters are excessively cold, and the peaks are covered more or less with snow eight months in the year, from which circumstance their name has been derived. The Mt. Washington expedition in the winter of 1870-71 showed that the weather at the altitude of 6,300 ft. is characterized by violent winds, whose velocity rose as high as 130 m. an hour, by more abundant precipitation of moisture than the low country, and a much lower average temperature; there was a fall of 55 inches for the year, against 46 at Newfound lake, the region of greatest rainfall elsewhere in the state. The Merrimack valley below Concord is the warmest part of the state; and the abundant waterfalls here have caused the growth of the manufacturing towns of Manchester, Nashua, Suncook, and Hooksett. All parts of New Hampshire are exceedingly healthful, and cases of remarkable longevity are very numerous. The cold weather begins about the last of October and continues till May; and from the latter part of November till the opening of spring the whole country is usually covered with snow, and the rivers are frozen.—The natural productions include the oak, pine, hemlock, ash, spruce, beech, birch, and other trees, which are largely exported in the shape of lumber. The sugar maple is abundant. The native animals, though scarce, are not yet exterminated; wolves, bears, and other wild beasts are still found in the N. part of the state, and occasionally commit depredations on the farms. Wild fowl and game are abundant, and both lakes and rivers are stocked with fish.—The farm lands of New Hampshire in 1870 comprised 2,334,487 acres of improved and 1,271,507 of unimproved land, including 1,047,090 acres of woodland. The total number of farms was 29,642, of which 1,376 comprised from 3 to 10 acres, 2,064 from 10 to 20, 7,194 from 20 to 50, 10,107 from 50 to 100, 8,804 from 100 to 500, 75 from 500 to 1,000, and 6 over 1,000. The average size of farms was 169 acres; percentage of improved to total land in farms, 68·8. The cash value of farms was \$80,589,313; of farming implements and machinery, \$3,459,943; total amount of wages paid during the year, including value of board, \$2,319,164; total estimated value of all farm productions, including betterments and additions to stock, \$22,473,547; orchard products, \$743,552; produce of market gardens, \$119,997; forest products, \$1,743,944; home manufactures, \$234,062; value of animals slaughtered or sold for slaughter, \$3,720,243. The chief productions were 189,222 bushels

of winter and 4,399 of spring wheat, 47,420 of rye, 1,277,768 of Indian corn, 1,146,451 of oats, 105,822 of barley, 100,034 of buckwheat, 58,375 of peas and beans, 4,515,579 of potatoes, 612,648 tons of hay, 155,334 lbs. of tobacco, 1,129,442 of wool, 5,965,080 of butter, 849,118 of cheese, 99,469 of hops, 1,800,704 of maple sugar, 56,944 of honey, 2,668 of wax, 2,446 gallons of wine, 2,352,884 of milk sold, and 16,884 of maple molasses. The total value of all live stock on farms was \$15,246,545. There were 39,095 horses, 90,583 milch cows, 40,513 working oxen, 91,705 other cattle, 248,760 sheep, and 33,127 swine. Besides these there were 4,240 horses and 13,368 neat cattle not on farms.—New Hampshire ranks high as a manufacturing state, and is especially noted for the extent of its textile industries. According to the census of 1870, only Massachusetts, Rhode Island, and Pennsylvania ranked above New Hampshire in the value of cotton goods produced. In the 36 cotton mills of this state were 19,091 looms and 447,795 frame and 302,048 mule spindles. The principal products of the 41,469,719 lbs. of cotton used were 89,326,701 yards of sheetings, shirtings, and twilled goods, 75,000 of lawns and fine muslins, 40,843,969 of print cloth, 442,696 of flannel, 1,845,199 of ginghams and checks, 5,260,000 of cassimeres, cottonades, and jeans, 237,026 lbs. of bats, wicking, and wadding, 28,300 of cordage, lines, and twines, and 1,595,700 seamless bags. The 156 woollen mills had 351 sets of cards, with a daily capacity in carded wool of 41,550 lbs., 909 broad and 699 narrow looms, and 117,057 spindles. The materials used comprised 1,079,120 lbs. of cotton, 1,380,000 of shoddy, and 8,785,832 of domestic and 793,433 of foreign wool. Among the products were 184,800 pairs of blankets, 2,481,416 yards of cassimeres and doeskins, 184,200 of felted cloth, 13,141,565 of flannels, 75,000 of frocking, 1,001,000 of kerseys, 720,507 of satins, 32,000 of tweeds and twills, 110,075 lbs. of rolls, and 485,600 of yarn. In the production of worsted goods, the state ranked after Massachusetts, Pennsylvania, and Rhode Island, and after those states and New Jersey in the production of printed goods. In 1870 the products of mining were valued at \$323,805, including stone worth \$309,720, silver quartz \$10,000, lead \$3,000, and zinc \$1,085. Other important industries are the production of boots and shoes, hosiery, lumber, starch, and wooden ware. The total number of manufacturing establishments reported by the census of 1870 was 3,342, using 280 steam engines of 8,787 horse power, and 2,312 water wheels of 68,291 horse power, and employing 40,783 hands, of whom 25,829 were males above 16 years of age, 12,775 females above 15, and 2,179 youth. The total amount of capital employed was \$36,023,743; wages paid, \$13,823,091; value of materials used, \$44,577,967; of products, \$71,038,249. The chief industries are shown by the following statement:

INDUSTRIES.	No. of establish- ments.	HORSE POWER.		Hands employed.	Capital.	Wages paid.	Value of materials.	Value of products.
		Steam engines.	Water wheels.					
Agricultural implements.....	24	26	458	184	\$174,550	\$78,505	\$77,714	\$254,470
Boots and shoes.....	257	97	....	3,107	1,068,215	1,228,314	3,011,992	6,162,259
Brick.....	57	55	....	544	181,805	112,040	88,570	818,881
Carpentering and building.....	109	24	182	457	154,180	204,875	291,481	667,069
Carriages and wagons.....	116	84	568	782	528,555	356,692	329,582	906,884
Cars, freight and passenger.....	2	225	....	190	200,000	100,000	256,250	879,750
Clothing, men's.....	75	60	....	798	250,840	207,358	451,980	820,714
Cotton goods.....	85	915	17,767	12,541	18,831,710	8,989,853	12,818,447	16,999,072
Flouring and grist mill products.....	195	820	6,853	388	660,840	74,914	2,496,054	2,747,798
Furniture.....	79	666	1,407	1,825	957,900	598,133	768,200	1,732,162
Hostery.....	28	12	868	1,081	855,460	405,083	881,646	1,757,445
Iron, forged and rolled.....	2	315	10	111	131,000	57,400	801,860	455,000
" castings, not specified.....	23	176	249	419	357,760	286,216	391,993	778,283
Leather, tanned.....	72	375	925	410	875,800	160,109	1,566,950	1,965,576
" curried.....	42	30	96	219	312,600	100,599	1,438,419	1,720,520
" dressed skins.....	12	....	224	38	35,400	10,380	82,525	58,140
Liquors, malt.....	4	118	....	113	276,810	58,800	373,156	635,850
Lumber, sawed.....	723	1,928	21,101	3,398	2,428,193	725,304	2,471,427	4,286,142
Machinery, not specified.....	36	172	609	897	841,150	180,786	165,266	500,550
" cotton and woollen.....	31	163	349	886	272,450	149,982	126,389	386,205
" fire engines.....	1	....	150	365	300,000	46,497	477,138	800,000
" railroad repairing.....	4	215	....	664	868,000	385,544	505,864	1,816,808
" steam engines and boilers.....	5	159	....	182	156,500	91,500	73,769	238,980
Paper, not specified.....	14	120	855	810	418,000	111,973	511,642	825,810
" printing.....	7	50	715	190	444,000	74,800	389,240	727,865
" wrapping.....	11	30	755	148	217,000	58,700	209,490	360,920
Printing, cotton and woollen goods.....	3	350	580	635	678,000	273,225	4,118,453	4,670,388
Saddlery and harness.....	85	....	....	260	138,540	80,401	187,775	806,720
Sash, doors, and blinds.....	28	206	541	354	248,450	150,130	223,981	481,666
Starch.....	66	122	1,131	294	246,200	23,381	308,685	405,242
Wooden ware.....	60	177	1,133	416	273,400	144,848	149,322	449,220
Woollen goods.....	66	588	4,687	3,279	4,598,500	1,853,992	5,264,520	8,703,807
Worsted goods.....	2	....	1,525	1,161	700,000	378,017	1,032,118	1,447,422

The greater portion of the foreign products consumed in New Hampshire is entered at Boston. Portsmouth, however, is a United States port of entry, where the value of imports during the year ending June 30, 1874, amounted to \$41,388. The exports were unimportant. The number of vessels that entered in the foreign trade was 54 of 9,794 tons, and 62 were cleared. The entries in the coastwise trade comprised 1,032 vessels, of 105,142 tons, including 329, of 10,477 tons, engaged in fisheries. The number of vessels that cleared in the coastwise trade

was 1,032. There were registered, enrolled, and licensed at this port 74, of 14,502 tons, of which 69 were sailing vessels.—The railroads of the state are subject to inspection by three state commissioners, who are required to report annually to the legislature. There were 92 m. of railroad in 1844, 467 in 1850, 661 in 1860, 736 in 1870, and 946 in 1874. The railroads lying wholly or partly in New Hampshire, with their termini and the number of miles completed in the state in 1874, are represented in the following table:

NAMES OF CORPORATIONS.	TERMINI.		Miles completed in the state in 1874.	Length between termini when different from preceding.	Capital stock paid in.
	From	To			
*Atlantic and St. Lawrence.....	Portland, Me.....	Island Pond, Vt.....	52	149	\$5,000,000
Boston, Concord, and Montreal.....	Concord.....	Northumberland.....	145	....	1,800,000
White Mountain branch.....	Wing Road.....	Fabyan Place.....	15	....	....
Boston and Maine.....	Boston, Mass.....	Portland, Me.....	35	116	6,921,274
Branch.....	Rollinsford.....	Great Falls.....	3	....	....
Leased, Dover and Winnipiseogee.....	Dover.....	Alton Bay.....	29	....	....
West Amesbury branch.....	Newton Village.....	West Amesbury, Mass.....	2	4	....
Cheshire.....	South Ashburnham, Mass.....	Bellows Falls, Vt.....	43	53	2,159,300
Leased, Ashuelot.....	Keene.....	South Vernon, Mass.....	28	22½	....
Concord.....	Concord.....	Nashua.....	35	....	1,500,000
Leased { Concord and Portsmouth.....	Manchester.....	Portsmouth.....	41	....	....
Leased { Manchester and N. Weare... Suncook Valley.....	Manchester.....	North Weare.....	19	....	....
Branch.....	Suncook.....	Pittsfield.....	20	....	....
†Eastern.....	Contoocook.....	Hillsborough Bridge.....	15	....	....
Fitchburg.....	Massachusetts State line..	Portsmouth.....	16	....	4,000,000
Peterborough and Shirley branch.....	Ayer Junction, Mass.....	Mason Village.....	9	23	....
Manchester and Lawrence.....	Manchester.....	Lawrence, Mass.....	22	26	1,000,000
Monadnock.....	Winchendon, Mass.....	Peterborough.....	14	16	197,257
Mount Washington.....	Base.....	Summit of Mt. Washington.....	3	....	....
Nashua, Acton, and Boston.....	North Acton, Mass.....	Nashua.....	5	20	263,500
Nashua and Lowell.....	Nashua.....	Lowell, Mass.....	5	14	800,000
Leased, Wilton.....	Nashua.....	Wilton.....	15	....	215,000

* Leased to Grand Trunk railway.

† Leased to Eastern of Massachusetts.

NAMES OF CORPORATIONS.	TERMINI.		Miles completed in the state in 1874.	Length between termini when different from the preceding.	Capital stock paid in.
	From	To			
Northern	Concord	White River Junction....	69	} 3,068,400
Branch	Franklin	Bristol	13	....
Leased, Concord and Claremont....	Concord	Sullivan R. E. in Claremont	56	....
Peterborough	East Wilton	Greenfield	10	} 1,045,270
Portland and Ogdensburg	Portland, Me.	Dalton	58	110	
Portland and Rochester	Portland, Me.	Rochester	3	52	
*Portland, Great Falls, and Conway ..	Conway Junction, Me.	North Conway	67	71	}
Portsmouth and Dover	Portsmouth	Dover	11	....
Sullivan County	Bellows Falls	Windsor, Vt.	26	....
*Wolfeborough	Wakefield	Wolfeborough	12	} 1,706,700
Worcester and Nashua	Worcester, Mass.	Nashua	7	46	
Leased, Nashua and Rochester	Nashua	Rochester	48	....
Total	946	763,945

On Nov. 1, 1874, there were 43 national banks in operation, with a paid-in capital of \$5,365,-000 and an outstanding circulation amounting to \$4,707,365, being \$14 79 per capita, 1 per cent. of the wealth of the state, and 87-7 per cent. of the bank capital. In May, 1874, there were 64 savings banks, with 92,788 depositors, and deposits aggregating \$28,829,377. The total liabilities amounted to \$30,333,792; loans, \$15,487,642. The fire insurance companies organized under the laws of the state comprised 16 town companies, 6 mutual not limited to towns, and the New Hampshire joint stock company. The amount of risks carried by the town companies was \$2,241,627, and by the mutual \$12,932,929. There were 56 fire and 5 marine insurance companies of other states and foreign countries licensed to transact business in New Hampshire. The amount of risks assumed by these companies and in force on Jan. 1, 1874, was \$38,535,887; premium receipts in 1873, \$486,679; losses paid, \$403,767. Thirty life insurance companies of other states were transacting business in New Hampshire, and had in force on Jan. 1, 1874, 10,150 policies, insuring \$14,682,950.—The constitution of 1784, amended in 1792, is the fundamental law of the state. The legislature, styled the general court, comprises a senate of 12 members and a house of representatives, the number of which, annually varying, in 1874-'5 was 341. The state is divided into 12 senatorial districts, not according to population as in other states, but according to the direct taxes paid by the different districts. The representatives are apportioned among the towns according to the number of ratable polls. A town having 150 ratable polls may choose one representative, and one additional representative may be chosen for every additional 300 polls. The legislature meets annually on the first Wednesday in June. The governor is advised in his executive duties by a council of five members. The members of the legislature, governor, and councillors are elected annually on the second Tuesday in March. A majority vote is necessary to election. If no candidate for governor receives a majority, that officer is elected by the

* Leased to Eastern of Massachusetts.

legislature. The right of suffrage is extended to every male 21 years old who has resided in the town six months, excepting paupers and persons who at their own request are excused from paying taxes. According to the constitution only Protestants are eligible to the office of governor or as senators or representatives; but this provision is practically obsolete. The selectmen of towns must submit to the inhabitants once in seven years the question of amending the constitution, when if a majority be in favor thereof a convention must be called, and if the amendments are carried by a two-thirds vote when submitted to the people they become law. The secretary, treasurer, state printer, and commissary general are chosen annually by joint ballot of the legislature. The salary of the governor is \$1,000 per annum; secretary, \$800 and fees; treasurer, \$1,800; adjutant general, \$600. Other interests of the state are under the supervision of commissioners of railroads, banks, insurance, and fisheries. All judicial officers, the attorney general, county solicitors, sheriffs, coroners, and registers of probate are appointed by the governor and council; county commissioners, treasurers, and registers of deeds are elected by the people. The judicial power is vested in a superior court of judicature and a circuit court, probate and police courts, and justices of the peace. The superior court consists of a chief, salary \$2,400, and two associate justices, who receive \$2,200 a year each. The circuit court consists of a chief and two associate justices, who receive \$2,200 a year each. Two annual law terms of the superior court are held in Concord, beginning on the first Tuesdays of June and December. At least two trial terms of the circuit court are held annually in each county. Besides appellate jurisdiction of all actions brought in the lower courts, the circuit court has general jurisdiction of all civil and criminal actions at law and equity, and exclusive cognizance of all petitions for divorce. Married women may hold property to their sole and separate use, and may dispose of it by will. New Hampshire is represented in congress by three representatives and two senators, and has therefore five votes in the

electoral college. The total debt of the state on June 1, 1874, was \$3,826,590, all of which is funded and will mature in 31 years in nearly equal annual amounts. The actual revenue and expenses of the state for two years ending May 31 were as follows:

REVENUE.

SOURCES.	1873.	1874.
State tax.....	\$900,000 00	\$600,000 00
Railroad tax.....	104,959 26	102,918 94
Insurance tax.....	11,710 92	12,179 41
Interest.....	4,478 88	20,721 44
United States war claims.....	.....	4,046 22
Balance municipal war loan.....	.....	196 23
Miscellaneous.....	264 00	.....
Totals.....	\$421,412 51	\$740,062 24

EXPENSES.

DESCRIPTION.	1873.	1874.
Ordinary expenses.....	\$118,736 78	\$136,721 52
Extraordinary expenses.....	44,808 58	87,566 97
Interest.....	251,908 83	259,798 77
Increase municipal war loan.....	.....	404 46
Totals.....	\$415,448 69	\$434,491 82
Excess of revenue over expenses.....	.....	805,570 42

The chief items of expense were as follows: executive department, \$3,130; secretary's, \$2,845; treasury, \$3,023; adjutant general's, \$2,403; public instruction, \$6,964; insurance department, \$877; legislature, \$45,549; supreme judicial court, \$17,980; probate court, \$7,662; state library, \$2,393; compiling provincial records, \$3,674; state house, \$3,804; asylum for insane, \$7,120; education of deaf and dumb, \$3,198; education of blind, \$2,850; reform school, \$8,263; state prison, \$2,467; New Hampshire medical school, \$5,000; normal school, \$5,486; volunteer militia, \$13,767; board of agriculture, \$4,934; mountain roads, \$3,000; geological survey, \$4,525. The total valuation of property in the state, made by the assessors of the several cities and towns for purposes of taxation, was reported at \$103,652,835 in 1850, \$127,018,117 in 1860, \$129,856,167 in 1864, \$149,065,290 in 1868, and \$152,987,177 in 1872. These returns are considered to be very much below the real value, which is estimated at more than \$250,000,000. The true value of real and personal estate was reported by the federal census of 1870 at \$252,624,112, and the assessed value at \$149,065,290, including real estate valued at \$85,231,288 and personal property at \$63,834,002. The state tax is divided among the several cities and towns according to an apportionment made every fourth year, based upon the assessed valuation of the taxable property. The amount varies. Before the war, when the state was without debt, it never exceeded \$70,000 a year; but since 1861 it has been as follows: for 1862, \$80,000; 1863, \$270,000; 1864, \$500,000; 1865 and 1866, \$750,000 each; 1867 and 1868, \$625,000 each; 1869, 1870, and 1871, \$600,000 each; 1872, \$300,000; 1873,

\$600,000; 1874 and 1875, \$400,000 each. Each city and town pays its proportion of this tax directly to the state treasury. Cities and towns also levy a tax for local purposes. The rate of taxation for all purposes varies in the several cities and towns, but is generally from $1\frac{1}{2}$ to $2\frac{1}{2}$ per cent. Railroads are taxed separately, the judges of the superior court fixing "the actual present value of the capital" and assessing it "as near as may be in proportion to the taxation of other property" in the towns where they are situated. The railroads pay these taxes to the state treasurer; and one fourth of the tax of each road is paid by him to the towns through which the road passes, in proportion to the share of its capital therein expended; such portion of the residue to towns where stock is owned as the number of shares owned there bears to the whole number of shares of the road; and the remainder goes to the state. The proportion of this tax to some towns more than pays their state tax. Savings banks pay 1 per cent. on their deposits, which is divided among the towns in proportion to the amount of deposits held by citizens thereof.—New Hampshire has no institution for the blind or the deaf and dumb, but the state in 1874 paid \$2,850 for the education of the former class in the Perkins institute in Boston, and \$3,198 for the education of deaf and dumb at the American asylum in Hartford. The asylum for the insane, opened in 1842, is in Concord. In 1874 the state paid \$6,000 for the support of indigent insane, and \$873 for the convict insane. The number of inmates on April 30, 1874, was 281, while the total number cared for during the year was 416, and the average number was 267. Of the 140 admitted during the year, 109 were supported by themselves or friends. The state prison in Concord was established in 1812, and on May 1, 1874, had 95 inmates. The earnings of the prison for the preceding year amounted to \$23,679, including \$22,106 from the labor of the convicts, and the expenses were \$13,067, leaving a net profit of \$10,612. The average number of working men was 75. The prisoners have the use of a library, and those who on entering cannot read or write are instructed in these branches. The state reform school at Manchester, opened in 1855, had 91 inmates on May 30, 1874; the whole number during the year ending at that date was 149. Boys and girls under 17 years of age are committed for offences against the laws. The ordinary English branches are taught. The chief employments are chair seating and farming. The ordinary expenses for the year were \$22,938; total expenses, \$27,684; total receipts, \$27,167, including \$8,000 from state treasurer, \$6,253 from labor of inmates, and \$10,434 from towns, &c., for board of inmates. At Franklin is the New Hampshire orphans' home school of industry, a corporate institution which was opened in 1871, and is supported by contributions.—The general su-

pervision of education is vested in the superintendent of public instruction, who is appointed by the governor and council for two years, and receives an annual salary of \$1,200 and expenses. The several towns annually choose committees, who superintend the schools, examine teachers, grant certificates, dismiss teachers and pupils when necessary, select text books, determine with the selectmen the location of school houses and change of districts, and make annual reports to the town and state. Prudential committees are annually chosen by the districts, and have general charge of the school houses and the employment of teachers. In 1872 the legislature passed a law making women eligible as members of the town and prudential committees. High schools may be established by vote of the town or by the union of contiguous districts. There is no general state revenue for the maintenance of common schools. Public schools are supported by local taxation of property, each town being required to raise for this purpose \$3 50 for every dollar of its apportionment of the state tax. Towns or districts may vote additional sums for school purposes. There is also a literary fund for the maintenance of public schools, arising from a tax of one half of one per cent. on the capital stock of savings banks. Several towns and districts have permanent local funds for the support of schools. The state provides for the registration of pupils, statistical returns, and annual teachers' institutes in each county. A compulsory educational law was passed in June, 1871, requiring all children between 8 and 14 years of age to attend school at least 12 weeks every year, under penalty of \$10 for the first and \$20 for every subsequent violation of the statute. The progress of the state in respect to public schools during the last decade is as follows:

PARTICULARS.	1863-'4.	1873-'4.
Number of school districts.....	2,328	2,148
" of schools.....	2,487	2,502
" of graded schools.....		330
Average length of schools in weeks....	20.5	20
Legal school age.....	4 to 21	4 to 21
Total school population of the state....		
Number of pupils enrolled.....	83,401	69,178
Average daily attendance.....	52,826	47,275
Number of pupils between 4 and 14 not attending any school.....	3,440	2,598
Number of male teachers.....	759	482
Average monthly wages.....	\$26 99	\$44 87
Number of female teachers.....	3,262	3,330
Average monthly wages.....	\$15 05	\$24 90
Amount of school revenue raised by taxation as required by law.....	\$197,869	\$354,529
Additional amount raised by town or district tax.....	\$17,379	\$35,500
Amount received from local funds, railroad tax, and literary fund.....	\$36,032	\$43,478
Amount contributed by individuals....	\$10,489	\$9,272
Total school fund.....	\$261,819	\$438,104
Total expenditures.....	\$280,379	\$306,846
Average cost per pupil.....	\$3 13	\$7 05
Estimated total value of school houses	\$916,894	\$2,208,025

The state normal school was opened in 1871 at Plymouth, Grafton co. Up to June, 1874, the legislature had appropriated \$18,000 for perma-

nent improvements, and annual appropriations have been made for current expenses. The institution depends upon these annual appropriations and the proceeds from tuition; the rate per pupil is about \$25 a year. Besides a preparatory course, there are two courses of instruction of one year each. A certificate of graduation from the first entitles the holder to teach in the state three years, and of the second five years. In 1874 there were four instructors in the normal department; the number of graduates from the opening of the school was 102. In 1873 the institutions for secondary instruction were reported as 27 high schools, 17 academies, 5 seminaries for females, and 4 institutes; 37 of these reported an aggregate attendance of 3,685 pupils, including 1,915 females, and 96 teachers, of whom 55 were females. There are three schools devoted chiefly to preparing boys for college, the most noted of which, Phillips academy at Exeter, is described in the article on that town. The other two, St. Paul's school in Concord and Kimball union academy at Meriden, have extended facilities for instruction and a large attendance. The only college in the state is Dartmouth at Hanover, which besides the college proper comprises the Chandler scientific school, the Thayer school of civil engineering, the medical school, and the New Hampshire college of agriculture and mechanic arts. (See DARTMOUTH COLLEGE.) The leading institutions for the superior instruction of females are Adams female academy at East Derry, Robinson female seminary at Exeter (see EXETER), Tilden seminary at West Lebanon, the New Hampshire conference seminary and female college at Tilton, and the New Hampton literary institution at New Hampton. —According to the census of 1870, there were 1,526 libraries in the state, having 704,269 volumes. Of these 856, with 379,876 volumes, were private, and 670, with 324,393 volumes, other than private, including the state library in Concord, with 13,500 volumes; 32 town and city, 44,744; 21 school and college, 30,800; 538 Sabbath school, 164,570; 38 church, 7,425; 4 of historical, literary, and scientific societies, 18,510; and 29 circulating, 47,217. The largest library in the state is that of Dartmouth college, which had 46,000 volumes in 1874. The other chief libraries are the Manchester city library, 20,000 volumes; New Hampshire historical society, Concord, 7,500; Concord city library, 6,400; and the Portsmouth Athenæum, 12,000. The whole number of newspapers and periodicals in 1870 was 51, having an aggregate circulation of 173,919, and issuing annually 7,237,588 copies. There were 7 daily, with a circulation of 6,100; 37 weekly, 75,819; and 1 semi-monthly, 67,000. In 1874 the whole number reported was 60, including 9 daily, 44 weekly, 6 monthly, and 1 quarterly. The total number of religious organizations in 1870 was 633, having 624 edifices with 210,090 sittings and property valued at \$3,303,780. The leading denominations were as follows:

DENOMINATIONS.	Organi- zations.	Edifices.	Sittings.	Property.
Baptist, regular.....	102	90	31,935	\$492,200
" other.....	82	82	19,990	167,300
Christian.....	19	19	4,600	42,400
Congregational.....	169	172	67,951	1,150,380
Episcopal, Protestant...	21	22	7,475	203,800
Friends.....	13	13	3,585	15,500
Methodist.....	118	118	36,351	475,000
New Jerusalem (Swe- denborgian).....	1	1	275	2,000
Presbyterian.....	7	7	3,170	65,000
Roman Catholic.....	17	16	8,945	267,500
Second Advent.....	21	20	4,405	25,200
Shaker.....	2	2	300	1,800
Unitarian.....	23	22	7,680	207,000
Universalist.....	24	23	8,812	154,200
Unknown (union).....	12	10	4,066	29,500

—New Hampshire was first visited by Europeans in 1614, and the first settlements were made at Dover and Portsmouth in 1623. In 1641 the district was annexed to Massachusetts; it was made a royal province in 1679, but was again joined to Massachusetts in 1689. In 1741 it became a separate province, and remained so till the revolution. The early settlers were greatly annoyed by the Indians until after the English got possession of Canada. In 1689, in revenge for some injuries done them 13 years before, a party of Indians attacked Dover, killed many of the inhabitants, and burned several houses. The settlements of New Hampshire were gradually extended further W. than the original limits prescribed by the grant to John Mason in 1629, and it was supposed till 1764 that the territory at present included in Vermont formed part of the province, and grants of land were made in that direction by the authorities. The disputed district was claimed by New York, and a vexatious controversy ensued, which lasted till the independence of Vermont was acknowledged in 1790. In 1776 New Hampshire made a public declaration of independence, and established a temporary government to continue during the war. The state took an active part in the war of independence, and the men of New Hampshire were engaged on every battle field from Bunker hill to the surrender of Cornwallis. At the battles of Bennington, Stillwater, Saratoga, and Monmouth they were particularly distinguished for their bravery. On June 21, 1788, the state in convention ratified the constitution of the United States, 57 votes being cast for and 46 against it. On June 12, 1781, a convention assembled and prepared a constitution very similar to that which had been recently adopted in Massachusetts. After numerous alterations suggested by the people, the instrument went into force June 2, 1784. Pursuant to its provision for submitting the question of amending it to a vote at septennial periods, a convention assembled in Concord, Sept. 7, 1791, and adopted amendments, which were approved by the people and went into force in September, 1792. This constitution has since continued the supreme law of the state. In 1849 another convention was called,

which sat in Concord from Nov. 6, 1850, to April 17, 1851, and proposed numerous amendments; but only one was adopted, removing the property qualification of representatives. In 1807 the seat of government was permanently established at Concord. The aggregate number of troops furnished to the federal army by New Hampshire during the civil war was 34,605, or, reduced to a three years' standard, 30,827. The geological survey of New Hampshire has now (1875) been in progress six years, under charge of the state geologist, Prof. Charles H. Hitchcock. Five brief annual reports have been made, and the first volume of the final report was published in 1875. It is devoted to physical geography, and treats among other things of climatology, topography, altitudes, river systems, distribution of animals (particularly insects) and plants, agricultural geology, scenery, &c. Prof. Hitchcock has drawn a new map of the state, 2½ m. to the inch. (See supplement.)

NEW HANOVER, a S. E. county of North Carolina, bordering on the Atlantic and bounded W. by the Cape Fear river and one of its branches; area, about 1,000 sq. m.; pop. in 1870, 27,978, of whom 16,199 were colored. It has a level surface, with occasional swamps, and a not very fertile soil, and contains large forests of pine. Several railroads terminate at Wilmington. The chief productions in 1870 were 133,176 bushels of Indian corn, 88,892 of peas and beans, 94,713 of sweet potatoes, 398,925 lbs. of rice, 11,629 of wool, 29,950 of honey, and 4,622 gallons of wine. There were 633 horses, 410 mules and asses, 2,456 milch cows, 4,688 other cattle, 3,736 sheep, and 14,712 swine; 3 manufactories of carriages and wagons, 2 of railroad cars, 5 of cooperage, 1 of fertilizers, 2 of iron castings, 3 of machinery, 8 of tar and turpentine, 3 flour mills, 12 saw mills, and 1 ship yard. Capital, Wilmington.

NEW HARMONY, a town of Posey co., Indiana, on the Wabash river, 50 m. from its mouth, and 150 m. S. W. of Indianapolis; pop. in 1870, 836. It was built by the Harmonists under George Rapp in 1815, and purchased from them in 1824 by Robert Owen for the purpose of testing his social system, an experiment which resulted unsuccessfully. Mr. Owen sold a large portion to William Maclure, who there established a school of industry, which after a trial of about six years was abandoned.

NEW HAVEN, a S. county of Connecticut, on Long Island sound, bounded W. by the Housatonic river, and drained by the Naugatuck, Quinepiack, and other streams; area, 640 sq. m.; pop. in 1870, 121,257. The surface is generally uneven, mountainous in the middle and toward the east, and the soil is moderately fertile. On the coast there are several excellent harbors. It is intersected by several railroads, centring in New Haven. The chief productions in 1870 were 4,358 bushels of wheat, 56,868 of rye, 234,331 of Indian corn, 106,872 of oats, 17,039 of buckwheat, 511,009 of pota-

toes, 73,971 tons of hay, 103,562 lbs. of tobacco, 24,751 of wool, and 804,246 of butter. There were on farms 4,752 horses, 10,841 milch cows, 5,050 working oxen, 9,203 other cattle, 8,591 sheep, and 6,648 swine. There were 940 manufacturing establishments, with a capital of \$29,445,641, and annual products valued at \$45,156,181. The most important were 62 manufacturing of carriages and wagons, 5 of clocks, 18 of cutlery and edge tools, 55 of hardware, 10 of hoop skirts and corsets, 7 of India-rubber and elastic goods, 6 of forged and rolled iron, 25 of castings, 22 of machinery, 14 of plated ware, 1 of straw goods, 24 of tin, copper, and sheet-iron ware, 10 of woollen goods, and 17 saw mills. Capital, New Haven.

NEW HAVEN, a town, city, and port of entry of New Haven co., Connecticut, capital of the county and the largest city in the state, situated at the head of New Haven bay or harbor, 4 m. from Long Island sound, 33 m. S. S. W.

of Hartford, and 65 m. E. N. E. of New York; lat. $41^{\circ} 18' 23''$ N., lon. $72^{\circ} 56' 30''$ W.; pop. in 1810, 5,772; in 1820, 7,147; in 1830, 10,180; in 1840, 12,960; in 1850, 20,345; in 1860, 39,267; in 1870, 50,840, of whom 14,356 were foreigners. The number of families was 10,482; of dwellings, 8,100. The city stands on a plain about 2 m. wide, and is nearly surrounded by hills, from which delightful views may be obtained. Chapel street, the principal thoroughfare, extends in a W. N. W. direction throughout the length of the city. The dwelling houses are generally neatly built and surrounded by gardens, and many of them are almost hidden from view among trees. The number of magnificent elms with which the principal avenues are planted has caused New Haven to be called "the city of elms." They were mostly set out about the close of the 18th century by James Hillhouse, or through his influence and example. Of several public squares which adorn



New Haven, from Fort Hill.

the city, the principal are Wooster square, an enclosure of 5 acres in the E. part, laid out with remarkable elegance and good taste, and the "Green," 16 acres in extent, and shaded by beautiful elms. Hamilton park, a private ground, adjoining West river and Westville, comprises 55 acres. Works supply the city with water from Mill river, which flows through the E. part. Of the public buildings, the first in point of interest are those connected with Yale college. (See YALE COLLEGE.) The custom house, on Church street, is of Portland stone, and has apartments for the post office and United States courts. The state house, court house, city hall, hospital, medical college, orphan asylum, and almshouse are the principal other buildings. The New Haven burying ground, containing 18 acres, N. W. of the city, is beautifully laid out. The Evergreen cemetery, on West river, is large and tastefully adorned, and near it is a Catholic burying ground. There are several horse railroads. New Haven has

communication with New York and the principal points in New England by the following railroads: New York, New Haven, and Hartford; New Haven, New London, and Stonington; New Haven, Middletown, and Willimantic; New Haven and Northampton; and New Haven and Derby. It has regular communication with New York by steamboats.—The harbor of New Haven is shallow, and has extensive oyster beds; and the main channel from the junction of Quinepiack and Mill rivers is somewhat circuitous, and not of sufficient depth for large vessels. To meet the channel from the business part of the city two wharves, 3,500 and 1,500 ft. long, have been built, and there are other landings for steamboats. Operations for improving the harbor are in progress. Apart from the coasting trade, the chief commerce is with the West Indies, which the United States commercial reports do not fully exhibit, as much of the business of New Haven merchants is done through New York. There is also a

growing commerce with Europe. The value of imports during the year ending June 30, 1874, was \$1,066,174; of exports, \$592,903; entrances in the foreign trade, 95, tonnage 19,560; clearances, 51, 7,720; vessels belonging in the district, 167, 21,051, viz.: 142 sailing vessels, 13,499; 12 steamers, 4,900; and 13 unrigged craft, 2,652. There are 550 to 650 coastwise entrances and clearances annually. A capital of about \$10,000,000 is invested in manufactures. Clocks are made here very extensively, and are exported to the most distant countries. Carriage making is more largely carried on than in any other part of New England. Iron working, particularly in the lighter and more valuable products of that metal, and the manufacture of India-rubber goods, are prominent industries. Among the other productions are hay cutters, scales, boilers, brass ware, buttons, cars; coach lamps, lace, and trimmings; coffee pots, cutlery, files, fish hooks, needles, firearms, harnesses and saddles, ivory, jewelry, organs, melodeons, pianos, paper, pins, saws, corsets, shirts, and spectacles. There are nine banks of deposit, with an aggregate capital of \$4,664,000; a trust company, with \$100,000 capital; four savings banks, with deposits amounting to \$10,070,693; and two insurance companies, with a joint capital of \$300,000.—The city is divided into ten wards, and is governed by a mayor and a board of aldermen of two and a council of three members from each ward. There are efficient fire and police departments. The streets are well paved, drained, and lighted with gas. The principal charitable organizations are the home for aged and destitute women, the home for the friendless, and two orphan asylums. The valuation of property in 1873 was \$56,556,179; revenue, \$807,421; expenditures, \$726,910 90; city debt, \$790,000. The public schools, besides a high, grammar, and primary schools, embrace two training schools for teachers, two truant schools for boys, two ungraded schools for neglected children, and evening schools for both sexes. The number of school houses occupied in 1873 was 24; number of rooms, 155; number of sittings, 8,151; teachers employed, 200; pupils enrolled, 8,807; average attendance, 6,850. The Hopkins grammar school, an incorporated institution established in 1660, is chiefly designed for preparing boys for Yale college. There are also a collegiate and commercial institute, and more than 20 private schools. The city has five daily, one semi-weekly, and nine weekly newspapers, and four monthly and one quarterly periodicals. The number of churches is 51, viz.: Baptist, 5; Congregational, 13; Episcopal, 10; Jewish, 2; Lutheran, 1; Methodist, 11; Roman Catholic, 7; Second Advent, 1; Universalist, 1.—New Haven was settled in 1638 by a company chiefly from London under Theophilus Eaton, their first governor, and the Rev. John Davenport. It was a distinct colony till 1665, when after a protracted struggle it

was united with Connecticut under the charter of 1662. It was incorporated as a city in 1784. From 1701 to 1875 New Haven was one of the state capitals. (See HARTFORD, vol. viii., p. 489.)

NEW HEBRIDES, a group of volcanic islands in the S. Pacific ocean, N. E. of New Caledonia, between lat. 13° 15' and 20° 10' S., and lon. 166° 30' and 170° 10' E.; area, about 5,700 sq. m.; pop. about 134,000. Besides a great number of islets and rocks, they comprise about 20 islands of considerable size, the most important of which are Espiritu Santo, 70 m. long by about 25 m. broad; Mallicollo, 60 by 28 m., with a good harbor called Port Sandwich, in lat. 16° 25' S., lon. 167° 46' E.; Erromango, Tanna, Ambrim, Annatom, Banks, Sandwich, and Whitsuntide. Aurora, one of the most fertile of the group, said to have been 36 m. long by more than 5 m. broad, disappeared in 1871, leaving no trace of its existence. There is an active volcano in Tanna. Most of the islands are hilly, and there are high mountains. With the exception of Erromango and some smaller ones, they are all well wooded and supplied with good water, and present a luxuriant vegetation. Sandal wood and ebony are found. Yams, taro, shaddocks, bananas, limes, cucumbers, cocoanuts, and a species of sweet potato are cultivated. There are few animals; the most remarkable is a diminutive species of hog, which when full-grown is not larger than a rabbit. The natives, of the Papuan negro race, are less intelligent than the other South sea islanders, and are accused of cannibalism. Their habits are disgusting, their persons filthy, and their faces smeared with turmeric and charcoal. The use of betel nut and chunam is general; and the language is said to possess a similarity to the Malay. They have no canoes, and use a sort of raft, on which they only venture a few hundred yards from the shore.—The group was discovered by Quiros in 1606; but he only saw the N. and largest island, and supposing it to be a portion of the long-sought southern continent, he named it Australia del Espiritu Santo. He speaks of it as one land, and made no attempt to verify his conjecture. Bougainville, more than a century and a half later, ascertained that the N. portion consisted of several islands, which he called the Great Cyclades. Cook discovered the greater part of the S. chain in 1773, and called the whole group the New Hebrides; and as his discovery much exceeded in extent those previously made, this name has superseded that applied by Bougainville. Erromango, one of the most southerly islands, was the scene of the murder of the well known missionary the Rev. John Williams (Nov. 20, 1839).

NEW HOLLAND. See AUSTRALIA.

NEW IRELAND, an island in the S. Pacific ocean, between lat. 2° and 5° S., and lon. 150° 30' and 153° E. It is separated from New Britain on the southwest by St. George's channel, and from New Hanover on the northwest by

Byron's straits; length about 200 m., average breadth 20 m.; area, about 4,300 sq. m.; pop. about 11,000. The hills rise to the height of 1,500 or 2,000 ft., and are clothed from base to summit with the most luxuriant forests. The highest peaks are known as "Mother and Daughter." The timber grows to a great height, many of the trees being 80 or 90 ft., perfectly straight, and 9 ft. in circumference. The indentations of the coast offer several very commodious harbors. The lower tracts are well cultivated, and produce sugar cane, bananas, cocoanuts, yams, and numerous other plants and trees. The inhabitants belong to the Australian negro race, and their villages are very neat. Their canoes are well built, but not large. Dogs, pigs, and turtles are the chief animals. The islanders trade in fancy woods and tortoise shell, the latter of superior quality.

NEW JERSEY, one of the thirteen original states of the American Union, situated between lat. 38° 56' and 41° 21' N., and lon. 73° 54' and 75° 33' W.; extreme length 167 m., average breadth 50 m.; area, 8,320 sq. m. It is bounded N. E. by New York; E. by the Hudson river, which separates it from New York, by New York bay, and the Atlantic ocean; S. by the Atlantic and by Delaware bay; and W. by Del-



State Seal of New Jersey.

aware and Pennsylvania, from which it is separated by the Delaware river. The state is divided into 21 counties, viz.: Atlantic, Bergen, Burlington, Camden, Cape May, Cumberland, Essex, Gloucester, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Salem, Somerset, Sussex, Union, and Warren. The cities, according to the census of 1870, are: Bridgeton, pop. 6,830; Burlington, 5,817; Camden, 20,045; Elizabeth, 20,832; Harrison, 4,129; Hoboken, 20,297; Jersey City, 82,546; Millville, 6,101; Newark, 105,059; New Brunswick, 15,058; Orange, 9,348; Paterson, 33,579; Plainfield, 5,095; Rahway, 6,258; Salem, 4,555; and Trenton, the capital, 22,874. The population of the state and its rank in the Union, according to the federal enumerations, have been:

YEARS.	White.	Free colored.	Slaves.	Total.	Rank.
1790.....	169,954	2,762	11,423	184,139	9
1800.....	194,325	4,402	12,422	211,149	10
1810.....	226,868	7,843	10,551	245,562	12
1820.....	257,409	12,460	7,557	277,426	13
1830.....	300,266	18,303	2,254	320,823	14
1840.....	351,588	21,044	674	373,306	13
1850.....	465,509	23,810	236	489,555	19
1860.....	646,689	25,318	18	672,035	21
1870.....	875,407	30,658	.....	906,096	17

Of the total population in 1870, which included 16 Indians and 15 Chinese and Japanese, 449,672 were males and 456,424 females; 717,153 were native born, of whom 575,245 were born in the state, 74,750 in New York, and 32,947 in Pennsylvania; 188,943 were foreigners, including 54,001 born in Germany, 3,130 in France, 26,614 in England, 86,784 in Ireland, and 5,704 in Scotland. The density of the population was 108.91 to the square mile. There were 183,043 families, with an average of 4.95 persons to each, and 155,936 dwellings, with an average of 5.81 to each. The increase of population from 1860 to 1870 was 34.83 per cent. The number of male citizens 21 years old and upward was 194,109; of persons from 5 to 18 years of age, 262,862; attending school, 158,099. There were 37,057 persons 10 years old and upward unable to read, and 54,687 who could not write; of the latter, 29,726 were of native and 24,961 of foreign birth; 42,821 were 21 years of age and over, of whom 36,431 were white and 6,390 colored, 17,396 males and 25,425 females. The number of paupers supported during the year ending June 1, 1870, was 3,356, at a cost of \$283,341. Of the total number (2,390) receiving support June 1, 1870, 1,669 were of native birth, including 301 colored, and 721 were foreigners. The number of persons convicted of crime during the year was 1,040; in prison June 1, 1870, 1,079, of whom 640 (including 157 colored) were natives, and 439 foreigners. There were 317 blind, 231 deaf and dumb, 918 insane, and 436 idiotic. Of the total population 10 years of age and over (680,687), there were engaged in all occupations 296,036; in agriculture, 63,128, of whom 29,240 were laborers and 32,077 farmers and planters; in professional and personal services, 83,380, including 1,236 clergymen, 26,242 domestic servants, 232 journalists, 39,820 laborers not specified, 888 lawyers, 1,208 physicians and surgeons, and 2,098 teachers not specified; in trade and transportation, 46,206; and in manufactures, mechanical and mining industries, 103,322, of whom 3,823 were blacksmiths, 5,349 boot and shoe makers, and 12,569 carpenters and joiners. The number of deaths was 10,586, or 1.17 per cent. of the population. There were 1,822 deaths from consumption, or 5.8 deaths from all causes to one from that disease; from pneumonia 700, or 15.1 from all causes to one from that disease; from cholera infantum, 783; croup, 215; diphtheria, 177; scar-

NEW JERSEY

Scale of Miles

5 10 20 30

County Towns • Railroads

This type indicates a population of 5,000 or over.



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let fever, 781; enteric fever, 336; diarrhœa, dysentery, and enteritis, 552. In 1873 the state authorities reported 6,636 marriages, 20,866 births, and 11,479 deaths, including 1,502 from consumption and 638 from cholera infantum.—New Jersey has a direct coast line of 120 m., exclusive of the coasts on the Raritan and Delaware bays; but including smaller bays, islands, and tide-water creeks, this shore line is much longer. On the northeast the Hudson river, and New York, Newark, and Raritan bays, afford good harbors. From Sandy Hook to Cape May there is a narrow sandy beach, intersected at a few points by narrow inlets, and separated from the mainland by long and narrow bays and tide meadows traversed by numerous tidal watercourses, called thoroughfares. These bodies of water form an internal water route, and afford safe harbors for vessels of light draught. They communicate with the ocean through Manasquan, Barnegat, Little Egg harbor, Great Egg harbor, and other inlets. On the Delaware bay there is a belt of tide meadow from 1 to 12 m. wide bordering the water, with no good harbors. The state is well watered by a river system which flows E. into the bays and the Atlantic ocean and W. into the Delaware river and bay. A small portion of the state is drained by the Wallkill, which runs N. E. to the Hudson river. The Hackensack and Passaic rivers empty into the northern end of Newark bay; the Raritan, into Raritan bay; the Nevisink, into Sandy Hook bay; and the Little Egg Harbor or Mullicas river and the Great Egg Harbor river, into the Atlantic. Maurice river, emptying into Delaware bay, is the largest stream of S. Jersey. These are all navigable for distances of 10 to 20 m. from their mouth. The Delaware receives a number of streams from 10 to 40 m. long, but none of them above Trenton are navigable.—The surface of the state in the N. W. portion is mountainous; in the N. E. and central portions, hilly; in the southern, low and gently undulating. The mountains in the north belong to the Appalachian system, and consist of two main ranges: the Blue or Kittatinny mountain, near the Delaware river, known in New York as the Shawangunk mountain, and the Highland range. These are separated by a valley about 10 m. wide, known as the Kittatinny valley. The Highland range consists of a series of parallel ridges whose heights vary from 1,000 to 1,450 ft. above tide water. The most prominent of these are the Ramapo, Trowbridge, Wawayanda, Hamburg, Schooley's, Musconetcong, Scott's, and Jenny Jump mountains. The Blue mountain range, the highest in the state, is from 1,400 to 1,800 ft. above the ocean. The N. E. and central portions of the state consist of a great plain, diversified by the trap ridges of the Palisades including First and Second mountains, Sourland mountain, and Rocky hill, from 300 to 600 ft. high. S. E. of a line connecting Amboy and Trenton the sur-

face is lower and the hills slope more gently. The Nevisink Highlands are the highest, being 375 ft. above the ocean. Very few other elevations in this part of the state exceed 200 ft.—All of the great geological periods are represented in New Jersey, excepting the carboniferous or coal and the Jurassic. The rock formations cross the state in belts from N. E. to S. W. The oldest of these, known as the azoic or archaic formation, constitutes a broad belt forming the Highlands. On the line between New Jersey and New York it is 23 m. wide, stretching from Sufferns to the Wallkill river; on the Delaware it is only 9 m. in breadth. There is also a small outcrop of the rocks of this formation near Trenton; they extend N. E. from Trenton, along the N. side of the canal, about 6 m., and northward along the Delaware about 2 m. A very limited area of these rocks underlies Jersey City. The rocks of this formation are nearly everywhere stratified, and these strata have a strike of N. E. to S. W., and dip generally at a high angle toward the southeast. They are mainly gneiss, crystalline limestone, mica schist and slate, granite, and syenite. The syenitic gneiss greatly preponderates. No fossils are found in them. Near the surface in the S. W. portion of this belt these rocks are much disintegrated, forming a very superior and enduring soil. Toward the northeast they are much firmer, and the outcropping ledges show little change or weathering. The granite and gneiss make good building material, and they are quarried in a few places for this purpose. Magnetic iron ore occurs abundantly in this formation, in beds interposed between the gneissic strata, and also as a mineral component of the rocks. There is a large number of productive mines in this belt in Sussex, Passaic, Morris, and Warren counties; their total product in 1873 amounted to 665,000 tons. About one fifth of the production is annually worked up in the blast furnaces at Ringwood, Boonton, Stanhope, Oxford Furnace, and Phillipsburg, in the state; but the greater portion goes to the anthracite furnaces of Pennsylvania. In the white, crystalline limestone at Ogdensburg and Franklin, in Sussex co., there are large beds of zinc ore associated with franklinite, supplying the extensive zinc works at Newark and Jersey City. Northwest of the azoic formation, and occupying some of the valleys in the Highlands, are the rocks of the Silurian and Devonian epochs. The most extensive of these is the magnesian limestone, a blue sedimentary rock seen in the Kittatinny, German, Musconetcong, Pohatcong, and Wallkill valleys, and to a less extent in a few other localities. Its stone is largely used for building and in the manufacture of lime. Hematite ore, of which there are about a dozen mines, occurs in it. The lowest member in the Silurian system is the conglomerate and sandstone, which makes up the Bearfort or Rough, Greenpond, and Copperas mountains, and other lower ridges, and the thin belt of gray sandstone found be-

tween the gneissic rocks and the magnesian limestone. The latter, known as the Potsdam sandstone, crops out at Franklin and Vernon in Sussex co., and at Oxford Furnace and other points in Warren co. The third member in this system, ascending, is the Hudson river slate, which has an extensive outcrop in the Kittatinny valley, and forms the E. slope of the Blue or Kittatinny mountain. It shows nearly everywhere its tendency to cleavage, and it is quarried at the Delaware Water Gap and at Newton for roofing slate. Some of the thicker and more arenaceous beds are used for flagging stone. In the Blue mountain the gray conglomerate, the equivalent of the Oneida conglomerate, has a wide and unbroken outcrop from the Delaware river to the New York line. Overlying it, and forming the western and lower slope of the Blue mountain, is the Medina sandstone; the rocks are red sandstones and shales, and a few vegetable forms are occasionally seen in them. West of this, and occupying the narrow valley of the Delaware, are several formations or members of the Silurian and Devonian epochs. Southeast of the Highlands there is a wide belt of red shales and sandstones of the triassic period. This occupies a large part of Bergen, Passaic, Essex, Union, Somerset, Hunterdon, Middlesex, and Mercer counties, and is 30 m. wide on the Delaware river. The rocks are red argillaceous shales and sandstone, with a few limited outcrops of calcareous and silicious conglomerates on the N. W. border, near the azoic rocks. Within the limits of this formation there are several long outcrops of trap rock lying between beds of shale and sandstone, forming the well known Palisades, First and Second mountains, Pickles mountain, Sourland mountain, Rocky hill, and others. Narrow dikes of trap are also known. The sandstone is extensively quarried for building at Paterson, Little Falls, Newark, Trenton, Centre Bridge, and in other places. Fossil fish have been found in the rocks of this formation at Pompton, Boonton, and near Somerville. Fossil plants are more common. Copper ores and native copper are common in the altered sandstone near the junction of the trap rocks, occurring irregularly disseminated through the sandstone, and not in veins or beds. Several copper mines were early opened, but none of them are now in operation. The next formation S. E. of the triassic rocks is the plastic clay series belonging to the cretaceous period. In this are the valuable beds of fire clay and potter's clay which are so largely dug in the vicinity of Woodbridge and Amboy, and near Trenton. Fossil wood and leaf prints with a few cretaceous shells are found in this series. This belt follows the Delaware from Trenton S. W. to Salem. The next geological formation on the southeast is the clay marl, occupying a narrow belt entirely across the state. The beds are mainly astringent clays containing a small percentage of greensand. The next belt S. E.

is that of the greensand marl beds, stretching from Sandy Hook to Salem. There are three beds, separated by beds of sand, dipping gently toward the southeast. They are characterized by the mineral glauconite or greensand which makes up most of their mass. (See GREENSAND.) Generally there is some carbonate and some phosphate of lime in these beds, and hence the value of this marl as a fertilizer. Many fossils characterize these beds and help to fix their geological age. The S. E. portion of the state is supposed to belong to the tertiary age. There are beds of calcareous marl near Shiloh, Cumberland co., which are undoubtedly miocene, and are very full of shells. Beds of glass sand, which are extensively worked, occur along Maurice river near Millville, at Winslow, Jackson, and other places. The higher grounds in this part of the state are gravelly, and probably belong to the modified drift. Bog ore is found in many places, generally under the peat or mud of wet meadows. The drift period is represented nearly everywhere throughout the state in the superficial beds of sand, gravel, and boulders. These beds are thicker and the boulders are larger in the northern than in the southern part of the state. The smoothed, polished, and striated rock surfaces so common on the harder rocks also represent this period. Alluvial beds are found in isolated patches, sometimes of great extent, as in the wet meadows along the Paulinskill, Pequest, and Passaic rivers. Peat bogs are also common, although they are not generally of great area. Under some of these, in the limestone districts of Sussex and Warren counties, there are beds of calcareous or shell marl a few feet thick. There are extensive tide meadows bordering the tide waters, from 5 to 10 ft. above low-water level, and still in process of formation. Along the Atlantic coast there is a long line of sand beach, which is geologically a long dune, constantly changing in location, extent, and form. These belong to the present or historic period.—New Jersey offers numerous attractions to travellers, among which are the falls of the Passaic at Paterson; the passage of the Delaware through the Blue mountains, called the Delaware Water Gap; the well known bathing places of Cape May, Long Branch, Deal, Squan beach, Atlantic City, and Tuckerton; Schooley's mountain in Morris co., with a mineral spring on its summit; Lake Hopatcong, Greenwood and Budd's lakes, and other points in the northern highlands. The climate varies much in different parts of the state. In the north, where the country is more elevated, it is much colder than toward the south, where the influence of the ocean and a low situation is felt. The annual mean temperature of the southern end of the state is between 53° and 54°; that of the northern end from 48° to 50°. The annual rainfall is about 44 inches; annual mean barometer, 30. Fevers and ague prevail in the neighborhood of the marshes, but upon the seashore and in the

hilly regions the climate is remarkably healthy. The soil is productive, though of varied character. That of the northern part of the state, including the Kittatinny valley, is characterized by its abundant crops of grain and grass, and rich pasturage. The middle portion of the state, which is the most thickly settled, has been enriched by the judicious use of lime, greensand mark, and other fertilizers, and yields abundant farm crops, market garden products, fruit, &c. The southern part of the state has a light soil, and has been but partially cleared. The nearness of New Jersey to the great markets of New York and Philadelphia has stimulated its farmers to improve their soil. The strip bordering on the Delaware from Trenton to Salem is probably the most skilfully cultivated and productive land in the United States.—The vegetation presents no remarkable features, being similar to that of the central states generally. In the north are found the oak, hickory, and other forest trees, and in the south are valuable pine woods, cedar swamps, and a considerable growth of stunted oaks. The central region is the most thoroughly improved part of the state, and forms a vast market garden from which New York and Philadelphia are in large part supplied. The apples and cider of this locality are famous, and the peaches of the more southerly section are excellent and abundant. Muskmelons, watermelons, sweet potatoes, Irish potatoes, Indian corn, wheat, rye, oats, hay, flax, grass seed, plums, apricots, and cherries are raised; honey, beeswax, and butter are made; and there is also a limited production of barley, tobacco, wine, silk, maple sugar, and hops. Several of the native wild animals, such as the fox, bear, and deer, are still seen in the forests. The total number of farms in 1870 was 30,652, of which 2,993 contained from 3 to 10 acres, 3,476 from 10 to 20, 7,376 from 20 to 50, 9,415 from 50 to 100, 7,299 from 100 to 500, 15 from 500 to 1,000, and 8 over 1,000. The average size was 98 acres. The land in farms was 1,976,474 acres of improved and 1,013,037 of unimproved, including 718,335 of woodland; the percentage of unimproved land to the total in farms was 33.9. The cash value of farms was \$257,523,376; farming implements and machinery, \$7,887,991; wages paid during the year, including value of board, \$8,314,548; estimated value of all farm productions, including betterments and additions to stock, \$42,725,198; orchard products, \$1,295,282; products of market gardens, \$2,978,250; forest products, \$352,704; value of home manufactures, \$144,016; of animals slaughtered or sold for slaughter, \$6,982,152. The productions were 2,099 bushels of spring and 2,299,334 of winter wheat, 566,775 of rye, 8,745,384 of Indian corn, 4,009,830 of oats, 8,283 of barley, 363,983 of buckwheat, 56,221 of peas and beans, 47,05,439 of Irish and 1,550,784 of sweet potatoes, 26,306 of clover and 72,401 of grass seed, 6,095 of flax seed,

521,975 tons of hay, 40,871 lbs. of tobacco, 336,609 of wool, 8,266,023 of butter, 38,229 of cheese, 19,033 of hops, 234,061 of flax, 60,636 of honey, 2,021 of wax, 5,373,323 gallons of milk sold, 24,970 of wine, and 17,424 of sorghum molasses. The total value of all live stock was \$21,443,463. There were on farms 79,708 horses, 8,853 mules and asses, 133,331 milch cows, 3,830 working oxen, 60,327 other cattle, 120,067 sheep, and 142,563 swine. The staple crops of 1873 were reported as follows:

CROPS.	Bushels.	Yield per acre.	Acres.	Total value.
Indian corn.....	10,442,000	36	290,055	\$6,474,040
Wheat.....	1,948,000	16.2	120,247	8,214,200
Rye.....	485,000	14.1	34,397	412,250
Oats.....	2,737,000	26.5	103,283	1,841,130
Barley.....	7,200	24	300	7,920
Buckwheat.....	288,000	16.5	17,454	276,480
Potatoes.....	3,560,000	90	39,555	2,885,200
Hay.....	Tons. 416,300	1.03	404,175	10,199,350

The total value of these crops was \$24,310,580. The number and value of domestic animals in 1874 were reported as follows:

ANIMALS.	Number.	Average price.	Total value.
Horses.....	115,700	\$132 08	\$15,281,656
Mules.....	15,000	146 65	2,199,750
Oxen and other cattle...	88,900	33 86	2,940,854
Milch cows.....	147,900	45 75	6,766,425
Sheep.....	125,900	5 14	647,126
Swine.....	168,000	10 29	1,677,270
Total.....	651,400	.....	\$29,413,081

It is estimated that more than half of all the cranberries produced in the United States are grown in New Jersey. In 1873 it was reported that 7,000 acres of cultivated and 10,000 of wild land were devoted to cranberries, and that the crop amounted to about 125,000 bushels, worth from \$2 50 to \$2 75 per bushel. The chief cranberry counties are Ocean, Atlantic, and Burlington.—The abundant water power of New Jersey, and its facilities of communication with the great commercial cities of the Union by railroads, canals, and rivers, have greatly developed its manufactures. In 1860 the amount of capital invested in manufactures was \$40,521,048, and the value of products \$76,306,104. In 1870 the state ranked seventh in the value of productions, and eighth in the extent of capital invested; next to New York in the production of hats and caps, next to Connecticut in India-rubber goods, next to Pennsylvania in steel, and next to New York and Pennsylvania in refined sugar and molasses. In the manufacture of silk goods and trunks New Jersey ranked above all other states. Of the total value (\$7,755,488) of all the trunks, satchels, and valises manufactured in the United States, \$3,793,000 were produced in New Jersey. The total number of manufacturing establishments reported by the census

of 1870 was 6,636, using 984 steam engines of 32,307 horse power, and 1,132 water wheels of 25,832 horse power, and employing 75,552 hands, of whom 58,115 were males above 16, 11,198 females above 15, and 6,239 youth.

The capital invested in manufactures was \$79,-606,719; wages paid, \$32,648,409; value of materials, \$103,415,245; of products, \$169,-237,732. The statistics of the leading industries were as follows:

INDUSTRIES.	No. of establishments.	Steam engines, horse power.	Water wheels, horse power.	Number of hands.	Capital.	Wages paid.	Value of materials.	Value of products.
Bleaching and dyeing.....	12	800	220	285	\$281,450	\$118,875	\$4,572,429	\$4,889,695
Boots and shoes.....	579	20	....	3,090	1,087,405	1,250,720	1,594,905	3,639,076
Bread, crackers, and other bakery products	183	55	....	550	357,500	196,645	900,922	1,377,386
Brick.....	118	1,119	....	2,366	1,886,560	679,157	438,965	1,695,530
Carpentering and building.....	570	257	10	3,743	1,488,992	2,038,562	4,443,001	8,105,125
Carriages and wagons.....	267	5	25	1,830	1,236,150	588,563	787,865	2,281,643
Clothing, men's.....	204	30	....	2,455	1,061,850	704,789	1,965,530	3,269,325
Cotton goods, not specified.....	14	1,175	840	2,249	1,550,000	629,171	1,266,702	2,326,167
" thread, twine, and yarn.....	14	633	422	1,873	1,217,500	387,580	731,932	1,789,061
Flouring and grist mill products.....	486	1,520	11,108	1,310	4,446,400	346,288	10,634,642	12,593,143
Glass, stained.....	2	88	....	27	72,000	22,061	28,527	65,900
" ware.....	8	125	....	1,627	1,277,000	657,311	579,913	1,564,127
" window.....	11	248	....	1,116	1,164,500	467,638	637,763	1,241,599
Hardware.....	49	442	43	1,163	957,700	605,352	519,692	1,457,135
" saddlery.....	31	136	22	612	343,200	324,365	206,738	725,260
Hats and caps.....	64	56	....	2,785	550,100	1,414,004	2,469,179	5,007,270
India-rubber and elastic goods.....	12	986	80	807	1,034,200	846,638	1,234,967	2,224,839
Iron, forged and rolled.....	21	2,625	817	2,032	2,123,097	1,249,930	8,430,350	5,297,593
" nails and spikes, cut and wrought.....	6	928	295	534	587,839	256,675	1,480,850	1,769,812
" pipe, wrought.....	3	155	....	273	896,595	131,700	501,712	722,000
" pigs.....	6	1,100	250	360	1,405,000	241,611	1,125,261	1,546,965
" castings not specified.....	85	1,187	1,054	2,039	2,376,541	1,146,689	2,105,384	8,897,505
Jewelry, not specified.....	39	239	....	1,502	1,844,900	942,081	1,622,291	8,815,679
Leather, tanned.....	67	385	110	617	1,273,387	347,760	2,444,205	8,110,657
" curried.....	61	48	20	279	658,600	220,314	2,444,170	2,932,401
" morocco, tanned and curried.....	5	2	....	117	199,500	82,500	328,635	625,949
" patent and enamelled.....	15	266	20	235	543,000	188,465	2,312,956	2,738,941
Liquors, distilled.....	56	149	89	153	187,930	16,887	167,360	454,734
" malt.....	46	536	5	523	2,942,300	329,139	1,659,113	3,219,484
Lumber, planed.....	15	425	60	166	299,100	82,030	614,082	585,452
" sawed.....	235	1,318	4,655	1,145	2,238,900	369,385	1,412,804	2,745,317
Machinery, not specified.....	64	591	230	1,160	2,546,500	640,342	794,466	1,772,342
" cotton and woollen.....	13	115	146	433	410,000	213,374	270,398	556,037
" railroad repairing.....	9	455	100	2,978	2,887,300	1,982,316	1,878,370	5,523,167
" steam engines and boilers.....	16	246	10	583	823,500	349,971	1,458,085	961,577
Molasses and sugar, refined.....	3	517	....	404	645,000	272,000	10,046,744	11,199,740
Paints, lead and zinc.....	8	867	25	395	1,395,000	229,930	722,304	1,203,082
Printing, cotton and woollen goods.....	5	600	250	789	1,024,400	368,629	839,530	5,005,997
Saddlery and harness.....	170	25	....	1,218	604,610	460,716	4,859,688	1,732,205
Sash, doors, and blinds.....	79	1,245	51	1,210	1,246,700	682,535	1,049,425	2,160,795
Silk goods, not specified.....	15	132	144	1,652	1,259,000	404,609	1,327,258	2,212,394
" sewing and twist.....	15	243	106	1,188	919,500	232,227	1,857,917	2,315,270
Soap and candles.....	21	195	....	395	1,170,700	184,884	1,281,320	1,606,234
Steel, cast.....	4	940	40	293	500,000	190,000	573,310	1,401,773
" springs.....	6	155	....	158	287,600	88,697	251,431	446,109
Stone and earthen ware.....	30	394	10	1,206	1,175,800	443,025	372,665	1,106,985
Tin, copper, and sheet-iron ware.....	143	18	....	759	738,196	348,568	878,885	1,667,020
Trunks, valises, and satchels.....	18	251	....	1,350	757,400	771,150	1,575,805	3,793,000
Woollen goods.....	27	627	461	1,090	1,169,200	334,442	1,209,316	1,896,525

The mining interests of New Jersey are important. The number of establishments in 1870 was 49; capital, \$2,501,700; annual productions, \$2,554,475, including iron ore valued at \$2,025,497, slate \$17,338, stone \$411,640, and zinc \$100,000. The products of mines, quarries, and clay banks in 1873 were valued at \$5,000,-000. The fisheries in the neighboring waters are a source of great profit, only five other states exceeding it in this respect according to the census of 1870. There were 947 hands and \$231,231 employed, and the total value of products was \$374,912, including oysters valued at \$152,350.—New Jersey is divided into six customs districts, of which the ports of entry are Newark, Perth Amboy, Tuckerton (district of Little Egg Harbor), Great Egg Harbor, Bridgeton, and Lambertton (district of Burlington). The direct foreign trade is carried on chiefly at Newark, where during the year ending June

30, 1874, the imports amounted to \$10,403 and the domestic exports to \$8,387, and Perth Amboy, where the imports were \$35,458 and the exports \$5,747. A portion of the northern part of the state is in the district of New York, and much of the foreign trade passes through Philadelphia. The movement of vessels in the coastwise trade, and the number registered, enrolled, and licensed, were as follows:

DISTRICTS.	ENTERED.		CLEARED.		REGISTER'D, &c.	
	No.	Tons.	No.	Tons.	No.	Tons.
Newark.....	53	13,153	46	11,537	137	12,059
Perth Amboy.....	57	11,572	34	7,738	392	35,407
Little Egg Harbor.....	..	..	..	..	67	6,224
Great Egg Harbor.....	9	1,504	2	239	131	15,397
Bridgeton.....	..	..	..	..	385	17,343
Burlington.....	1	94	..	..	62	7,752
Total.....	120	26,323	82	19,544	1,124	94,639

Ship building is carried on in all of these districts, there having been 75 vessels of 8,302 tons built in 1873.—By the free railroad law passed in April, 1873, monopoly is abolished, and railroads may now be built in all parts of the state under a general law. Among

the states, only Massachusetts and Connecticut have more railroads in proportion to territory than New Jersey. This state had 186 m. in 1845, 466 in 1855, 864 in 1865, 1,125 in 1870, and 1,267 in 1874. The different lines in operation in 1874, with their termini and lengths, were:

RAILROADS.	TERMINI.		Miles in operation in the state in 1874.
	From	To	
Bridgeton and Port Morris.....	Bridgeton.....	Port Morris.....	20
Camden and Atlantic.....	Cooper's Point.....	Atlantic City.....	60
Branch.....	Egg Harbor.....	May's Landing.....	7
Central of New Jersey.....	Jersey City.....	Phillipsburg.....	75
Branches., {	Newark.....	Elizabeth.....	5
	Newark and Elizabeth.....	Jersey City.....	7
	Newark and New York.....	Flemington.....	16
	South Branch.....	Dunkirk, N. Y.....	31
Erie.....	Somerville.....	Newark.....	6
Leased... {	Jersey City.....	Spring Valley.....	23
	Newark and Hudson.....	Nyack, N. Y.....	20
	New Jersey and New York.....	Paterson.....	14
	Northern New Jersey.....	Newark.....	11
	Paterson and Hudson River.....	Ramapo.....	15
	Paterson and Newark.....	Sen-Girt.....	28
Freehold and Jamesburg.....	Paterson.....	Morris and Essex railroad.....	5
Hibernia Mine.....	Jamesburg.....	Bergen Point.....	6
Jersey City and Bergen.....	Hibernia Mine.....	Hoboken.....	84
Leased by Delaware, Lackawanna, and Western.....	Jersey City.....	Bergen Tunnel.....	34
	Morris and Essex.....	Chester.....	13
	Branch.....	Montclair.....	6
	Chester.....	Delaware river.....	21
New Jersey Midland.....	Newark and Bloomfield.....	Unionville.....	74
	Warren.....	Atsion.....	70
New Jersey Southern.....	Clarksville.....	Port Monmouth.....	10
Branches.....	Jersey City.....	Toms River.....	7
	Sandy Hook.....	Pemberton Junction.....	18
	Eatontown.....	Atco.....	9
	Manchester.....	Bayside.....	46
Leased.....	Whitings.....	Barnegat Junction.....	13
	Atsion.....	Ogden Mine.....	10
Ogden Mine.....	Atsion.....	Franklin.....	24
Sussex.....	Toms River.....	Branchville.....	7
Branch.....	Nolan's Point.....	Tuckerton.....	81
	Waterloo.....	Trenton.....	56
Tuckerton.....	Junetion.....	Camden.....	61
United Railroad Companies of New Jersey.....	Whitings.....	Perth Amboy.....	6
	Jersey City.....	East Millstone.....	8
	South Amboy.....	Rocky Hill.....	7
	Junetion.....	Jamesburg.....	5
	New Brunswick.....	Princeton.....	3
	Monmouth Junction.....	Bordentown.....	6
	Monmouth Junction.....	Manunka Chunk.....	68
	Princeton Junction.....	Pemberton.....	24
	Trenton.....	Burlington.....	7
	Belvidere Delaware.....	Medford.....	6
	Camden and Burlington County.....	Vincent.....	3
	Branch.....	Flemington.....	12
	Mount Holly.....	Near Pemberton.....	14
	Mount Holly Junction.....	Millstone.....	22
Leased.. {	Lambertville.....	Hightstown.....	23
	Kinkora Division.....	Bridgeton.....	37
	Somerset Junction.....	Millville.....	22
	Pemberton and Hightstown.....	Cape May.....	41
West Jersey.....	Camden.....	Salem.....	17
Cape May and Millville.....	Glassboro.....	Swedesboro.....	11
Salem.....	Millville.....		
Swedesboro.....	Elmer.....		
	Woodbury.....		

The Morris canal extends from Jersey City to Phillipsburg, 101 m., and has a large business in conveying coal from Pennsylvania to New York. The Delaware and Raritan canal connects Trenton on the Delaware with New Brunswick on the Raritan, 43 m., and has a feeder 22 m. long, from Bull's Island (Delaware river) to Trenton. In 1874 the state contained 62 national banks, with a paid-in capital of \$13,908,350 and an outstanding circulation of \$11,092,810, being \$12 24 per capita, 1·1 per cent. of the wealth of the state, and 79·8 per cent. of the bank capital.—The

present constitution of New Jersey was adopted in August, 1844, and came into operation Sept. 2. It secures the right of voting to every white male citizen of the United States 21 years of age, who has resided in the state one year and in the county five months next preceding the election. The general election is held annually on the first Tuesday after the first Monday in November, and all votes are taken by ballot. The legislature consists of a senate of 21 members, one from each county, elected for three years, one third every year, and an assembly of 60 representatives elected

annually. The legislature meets annually on the second Tuesday in January. A majority of each house is sufficient to pass a bill over the governor's veto. The chief executive officers are the governor (salary \$5,000), elected by the people for three years; secretary of state (salary \$200 and fees), appointed by the governor with the advice of the senate, and *ex officio* auditor of accounts; treasurer (salary \$4,000), elected by the legislature on joint ballot for one year; comptroller (salary \$4,000); and the superintendent of schools (salary \$2,000), appointed by the state board of education. Senators and representatives receive during the session of the legislature \$3 a day for the first 40 days, and \$1 50 a day afterward. The judiciary consists of a court of errors and appeals, court of chancery, supreme court, courts of common pleas, orphans' courts, courts of general quarter sessions of the peace, circuit courts, and courts of oyer and terminer. The court of errors and appeals is composed of the chancellor, the judges of the supreme court, and six other judges appointed by the governor. It has appellate jurisdiction only, and is the last court of resort. Three terms are held annually in Trenton. The governor, chancellor, and six judges of this court constitute the pardoning power. The chancellor is appointed by the governor and senate for seven years, and holds a court of chancery three times annually in Trenton; salary \$5,500 and fees. There is also a vice chancellor, whose annual salary is \$5,000. The court of chancery has jurisdiction over all cases in equity, and exclusive original jurisdiction in divorce cases. The supreme court consists of seven justices, appointed for seven years from each of the seven judicial districts. They hold circuit courts and courts of oyer and terminer three times a year in each county, and are *ex officio* judges of the court of common pleas, orphans' court, and court of general quarter sessions of the peace of the several counties. They receive salaries of \$5,000 each, except the chief justice, who receives \$5,200. Three terms of the supreme court are held annually in Trenton. Judges of common pleas, not exceeding three in each county, are also appointed by the legislature for five years, and hold court three times a year in each county. Sheriffs, coroners, and justices of the peace are elected by the people. Justices of the peace have jurisdiction in certain civil suits where the amount in controversy does not exceed \$100. The property of a woman married after March 25, 1852, which she owns at the time of marriage, continues her separate property, free from the control of her husband or liability for his debts. If over 21 years of age, she may make a will, which must not however dispose of any interest to which her husband would be entitled by law at her death. If living with her husband, she cannot convey her property without his concurrence. The grounds for divorce are adultery and desertion for three years. Aliens

may hold real estate. New Jersey is represented in congress by seven representatives and two senators, and has therefore nine votes in the electoral college.—The state debt was contracted during the war, chiefly for the support of families of volunteers, and amounted in 1874 to about \$2,500,000. It is represented by bonds of which about \$100,000 fall due annually. The payment of principal and interest is met by tax and the income of the sinking fund. The amount of money received and disbursed by the state treasury during the year ending Nov. 1, 1874, was as follows:

FUNDS.	Receipts.	Disbursements.
State fund	\$1,707,141 68	\$1,618,416 54
War fund	283,884 55	286,247 25
School fund (including state school tax)	1,363,547 20	1,352,481 00
Agricultural college fund	6,960 00	6,960 00
State library fund	3,550 00	1,211 37
Total	\$3,365,083 43	\$3,265,266 16

The chief expenditures from the state fund included, besides smaller items, the following:

Northern New Jersey lunatic asylum	\$603,000 00
Loans	200,000 00
Printing	118,898 34
State militia	77,066 35
Legislature	65,257 98
Salaries of judiciary	60,850 96
Salaries of state prison	51,954 25
Salaries and fees	46,488 30
Public schools	35,000 00
Appropriation to state reform school	34,500 00
Lunatic asylum	34,112 26
Transportation and costs	33,691 73
State industrial school	23,000 00
Pensions	21,865 73
State house extension	20,000 00
State house expenses	17,000 19
Support of deaf and dumb	16,283 21
Normal school	15,000 00
Support of blind	14,260 11

According to the federal census, the total assessed value of property in 1860 was \$296,682,492, and in 1870 it was \$624,868,971, including \$448,832,127 real and \$176,036,844 personal estate. The total taxable valuation was returned by the state authorities at \$603,665,497 in 1872, and \$612,796,106 in 1873. In 1874 the personal property was valued at \$117,431,284; real estate, \$359,357,510; total, \$619,057,903. Upon the total valuation of the state there is levied a general tax of one and a half mill and a school tax of two mills per dollar. Railroad corporations are taxed one quarter of one per cent. on the value of their roads, equipments, &c. New Jersey has heretofore made no provision for the education of its deaf and dumb, blind, or feeble-minded; but about \$40,000 is annually expended by the state for their support in the institutions of other states. In 1873 a committee appointed pursuant to an act of the legislature, to inquire into the condition and needs of these defective classes, reported that there were in the state not fewer than 500 deaf and dumb, about 600 blind, and more than 1,000 feeble-minded, and recommended the establishment of a state institution for the education of each class.

There are two institutions for the care of the insane. The lunatic asylum in Trenton was opened in 1848, since which time 4,588 patients have been treated. During the year ending Nov. 1, 1874, 840 were under treatment. Of the 655 in the asylum at the close of the year, 106 were supported by their friends, 21 by the state, and 528 by counties. In 1875 an additional asylum for the insane was nearly completed at Morristown, and is one of the largest institutions of the kind in the United States, having accommodations for about 1,000 patients. (See MORRISTOWN.) Prior to 1870, \$60,000 was annually appropriated by the legislature for the maintenance of convicts in the state prison at Trenton; but since that time the institution has been a source of income to the state. During the year ending Nov. 1, 1874, the earnings were \$104,042, including \$101,814 from convict labor, and the expenses \$58,807, leaving a net gain, not including officers' salaries (about \$30,000), of \$45,334. The whole number in confinement during the year was 1,025; at the end of the year, 653. The state reform school at Jamesburg was opened in 1867, and on Nov. 1, 1874, had 184 inmates; the total number during the year was 298. They are chiefly employed in making chairs and shoes and in farm labor. The state industrial school for girls is near Trenton, and in 1874 had 19 inmates. A home for disabled soldiers is supported by the state at Newark, in which 1,365 beneficiaries were cared for in 1874; and a soldiers' children's home at Trenton, which had 150 inmates at the close of 1874.—Prior to April, 1871, New Jersey had no free school system, but its schools were then made free. The tax for school purposes is now assessed and collected by the state instead of the townships, and the funds are apportioned among the different districts according to the school population. Every district is required to maintain a school for at least nine months in the year, or forfeit its share of the apportionment. The permanent school fund amounts to \$857,426. The amount of the income from this fund that is devoted to schools is determined by the legislature, and is now \$35,000 annually; the remainder of the income goes to increase the principal. In 1871 the state gave to the free school fund the proceeds of sales and rentals of all riparian lands lying between high and low water marks, and chiefly in and near the harbor of New York on the New Jersey shore. These lands will add to this fund not less than \$5,000,000, and possibly \$10,000,000. The sources and amount of the funds for the support of the schools for the year ending Aug. 31, 1874, were: 1, the two-mill state tax, which amounted to \$1,225,592; 2, additional state appropriation, including the income of the school fund, \$100,000; 3, interest of the surplus revenue, \$31,573; 4, township tax, \$23,834; 5, district and city tax for teachers' salaries, \$311,161; total, \$1,691,160, besides \$613,238 derived from

district and city taxation for building and repairing school houses. The more immediate supervision of the schools is vested in a state superintendent and county superintendents, all of whom are appointed by the state board of education. County superintendents are authorized to hold examinations and grant certificates to teachers. A law forbidding corporal punishment in schools was enacted in 1867. The condition of the public schools for the year ending Aug. 31, 1874, was as follows:

Number of school districts.....	1,869
“ “ buildings.....	1,498
“ “ departments.....	2,885
Capacity of public schools.....	155,152
Number of unsectarian private schools.....	253
“ of sectarian private schools.....	101
“ of persons between 5 and 15 years old.....	298,000
“ enrolled in public schools (68 per cent.).....	186,892
Average attendance (52 per cent.).....	96,224
Attendance upon private schools (12 per cent.).....	86,527
Number not attending school (25 per cent.).....	71,895
Average time schools kept open.....	9 mos. 12 days.
Number of male teachers in public schools.....	960
Average wages per month.....	\$65 77
Number of female teachers.....	2,256
Average wages.....	\$38 00
Total amount appropriated for schools (\$1,691,160 for maintenance and \$613,238 for building and repairing school houses).....	\$2,304,398
Valuation of school property.....	\$6,000,732
Average annual cost of education per pupil according to school population.....	\$5 67
According to average attendance.....	\$17 57

In several of the manufacturing cities and towns evening schools are maintained for adults and others unable to attend the day schools. There is an institution for training teachers at Trenton, comprising a normal school and a model school. There are two courses of study in the former, one of two and one of three years. In 1873-'74 there were 12 instructors and 269 pupils in the normal, and 17 instructors and 443 pupils in the model school. The Farnham school at Beverly, which is aided by the state, serves as a preparatory institution for the normal school. Since 1871 the state has supported a free library system in the public schools by extending aid to such districts as raise funds for this purpose, and nearly 400 free school libraries have been established and receive annual aid from the state.—New Jersey has four colleges: the college of New Jersey (evangelical Protestant), in Princeton (see PRINCETON); Rutgers (Reformed Dutch), in New Brunswick; Seton Hall (Roman Catholic), in South Orange; and Burlington college (Protestant Episcopal), in Burlington. Rutgers college, organized in 1770, has a classical department with a four years' course, and a scientific department with courses in civil engineering and mechanics, in chemistry and agriculture, and a special course in chemistry. The scientific department of this institution has been designated by the legislature as the state college of agriculture and the mechanic arts, and is therefore entitled to New Jersey's share of the national grant of lands made for this purpose by congress in 1862; and 40 state students are educated in this department free of expense for tuition. An extensive model

farm is connected with it. Several funds have been established for the aid of indigent students and to afford prizes for excellence in scholarship. In 1874-'5 there were 14 instructors and 188 students, including 62 in the scientific department. Seton Hall college was founded in 1856 at Madison, and removed to South Orange in 1860. It affords collegiate, ecclesiastical, and commercial courses. In 1873-'4 there were 13 instructors and 129 students in the collegiate department, and 4 instructors and 33 students in the ecclesiastical seminary. Burlington college, organized in 1846, has a collegiate and a preparatory course. In 1874-'5 there were 11 instructors and 59 students. Instruction in theology is afforded by Drew theological seminary (Methodist), opened in 1867 at Madison, and having in 1874-'5 9 instructors, 9 lecturers, 127 students, a library of 12,000 volumes, and productive funds amounting to \$250,000; the theological seminary of the Presbyterian church in Princeton, organized in 1812, and having in 1874-'5 7 instructors and 97 students; the German theological school (Presbyterian) at Bloomfield, organized in 1869, and having in 1874-'5 5 instructors and 24 students; and the theological seminary of the Reformed (Dutch) church in America at New Brunswick, organized in 1810, and having in 1874-'5 4 professors and 39 students. The last named is the chief training school in the United States for the ministry of that denomination. It is substantially a theological department of Rutgers college, as the Princeton seminary is of the college of New Jersey. The schools of science, besides that of Rutgers college, are the Stevens institute of technology at Hoboken, one of the leading institutions of the kind in the United States (see HOBOKEN), and the John C. Green school of science, connected with the college of New Jersey (see PRINCETON). The state has no medical or law school. There is a business college in Trenton and one in Newark, and New Brunswick has a conservatory of music. The chief institutions for the superior instruction of females are St. Mary's hall, Burlington; the female college at Bordentown; Ivy hall, Bridgeton; Trinity hall, Beverly; and the seminary and female collegiate institute at Pennington. St. Mary's hall (Protestant Episcopal) in 1874 had 28 instructors and 200 students.—According to the census of 1870, there were in the state 1,893 schools of all classes, including 1,531 public, 13 classical, professional, and technical, 278 day and boarding, and 71 parochial and charity. The total number of teachers in all was 3,889, and of pupils, 129,800. The total income was \$2,982,250, including \$49,000 from endowment, \$1,499,550 from taxation and public funds, and \$1,433,700 from other sources, including tuition. The total number of libraries in 1870 was 2,413, containing 895,291 volumes; 777 with 359,612 volumes were private, and 1,636 with 535,679 volumes other than private,

including 14 circulating libraries with 75,250 volumes. The most important libraries are those of the college of New Jersey, which has 28,000 volumes; the theological seminary in Princeton, 25,000; Newark library association, 21,000; the theological seminary in New Brunswick, 20,000; and the state library in Trenton. The total number of newspapers and periodicals reported by the census of 1870 was 122, with a circulation of 205,500 copies, and an annual issue of 18,625,740. There were 20 daily, circulation 38,080; 95 weekly, 120,670; and 7 monthly, 46,800. In 1874 there were 20 daily, 3 semi-weekly, 132 weekly, 1 bi-weekly, and 10 monthly; total, 166. The total number of religious organizations was 1,402, having 1,384 edifices with 573,303 sittings, and property valued at \$18,347,150. The leading denominations were represented as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Property.
Baptist, regular.....	164	164	61,913	\$2,376,400
" other.....	4	4	1,200	20,500
Christian.....	10	10	3,430	54,000
Congregational.....	14	9	5,050	835,500
Episcopal, Protestant.	128	122	84,800	2,586,000
Friends.....	63	63	23,750	448,450
Jewish.....	1	1	800	8,000
Lutheran.....	19	19	6,750	111,500
Methodist.....	518	518	196,860	4,493,650
Moravian (Unitas Fratrum).....	4	4	1,300	16,500
New Jerusalem (Swe- denborgian).....	6	...	...	5,000
Presbyterian, regular.	250	250	127,700	8,616,025
" other....	1	1	500	7,000
Reformed church in America (late Re- formed Dutch)....	97	99	54,800	2,540,825
Reformed church in the United States (late German Re- formed).....	6	6	1,800	17,000
Roman Catholic.....	107	107	45,400	1,590,000
Spiritualist.....	2	2	800	3,300
Unitarian.....	1	1	400	10,000
Universalist.....	5	2	1,100	109,000
Unknown (union)....	2	2	450	4,500

—The precise date of the first settlement of New Jersey is not ascertained. The earliest colony was probably planted at Bergen, between 1617 and 1620, by the Dutch of New Amsterdam, who claimed the whole country as a part of New Netherland. In 1623 a Dutch company under Cornelis Jacobson Mey and Adriaen Jorisz built Fort Nassau on the E. shore of the Delaware, a few miles below the present site of Philadelphia. Sir Edmund Ployden obtained a grant of the country on the Delaware from the king of England in 1634, and called it New Albion; and in 1638 a small party of Swedes and Finns purchased land in the same region from the natives, and planted several settlements. The Dutch and Swedes afterward drove out the English colonists, and in 1655 the Dutch under Peter Stuyvesant, governor of New Netherland, dispossessed the Swedes and sent most of them back to Europe. In 1664 Charles II. of England, disregarding the claims of both parties, granted all the territory between the Delaware

and Connecticut rivers to his brother the duke of York, and sent an expedition to take possession of it. New Amsterdam was first conquered, the New Jersey settlements at once submitted, and under the authority of Nicholls, the commander of the expedition and first governor, a patent was granted to immigrants from Long Island and New England. Elizabethtown, Newark, Middletown, and Shrewsbury were now founded. In the mean time, however, the duke of York had sold his claim to Lord Berkeley and Sir George Carteret; they named the tract New Jersey in honor of Sir George, who had been governor of the island of Jersey, and had held it for King Charles in his contest with the parliament. They formed a constitution for the colony, and in 1665 sent out Philip Carteret, brother of Sir George, as governor. He fixed the seat of government at Elizabethtown; but his administration was unpopular, and in 1670 the people revolted and chose James Carteret, an illegitimate son of Sir George, for their governor. Philip Carteret, however, obtained several concessions and promises from the proprietors, which induced the people to submit again to his authority. The first legislative assembly of New Jersey, which had been held under his proclamation in May, 1668, passed a bill of pains and penalties remarkable for its extreme severity, the punishment of death being assigned for no fewer than 12 offences. In March, 1673, Berkeley sold his interest in the proprietorship to John Fenwick and Edward Byllinge, Quakers. In July of the same year the Dutch recaptured New York, and the surrounding country, including the whole province of New Jersey, at once fell into their hands. New Jersey was called by them *Achter Kol*. It reverted to Great Britain by the treaty of 1674, and the question now arose whether the title returned to the proprietors or the king. To avoid all difficulty, the king recognized the claim of Carteret, and made a new grant to the duke of York, who also executed a fresh conveyance to Carteret, covering however only a part of the original territory of New Jersey. But before making this conveyance, the duke had included the province in a commission given to Sir Edmund Andros, governor of New York, who refused to recognize the authority as governor of Philip Carteret, arrested all magistrates who would not submit to his own jurisdiction, and finally, on April 30, 1680, carried Carteret himself prisoner to New York. The duke was at last prevailed upon to acknowledge the claims of the proprietors, and in 1681 the government of Andros came to an end. In the mean time Fenwick and Byllinge, to whom Berkeley had sold his share in the province, conveyed an interest in it to William Penn and two other Quakers, Garven Lawrie and Nicholas Lucas; and Fenwick in 1675 established a Quaker settlement at Salem, near the Delaware. He claimed authority as chief proprietor over all that part of New Jersey S.

W. of a line drawn from Little Egg harbor to a point on the Delaware in lat. 41° N.; and the province continued for some years to be divided into East Jersey, subject to Sir George Carteret and his heirs, and West Jersey, under Fenwick and his associates. In February, 1682, the whole territory was purchased by William Penn and 11 other Quakers. The first governor under the new proprietors was Robert Barclay, a Scotchman, and one of the 12 purchasers, under whom the country became an asylum for the oppressed members of his creed, and for a time enjoyed great prosperity. But the number of proprietors, the frequent subdivisions and transfers of shares, and various other difficulties in the way of good government, soon involved the province in trouble; and in 1702 the proprietors surrendered the rights of government to the crown. Queen Anne appointed Lord Cornbury governor of New York and New Jersey, but each continued to have a separate assembly. In 1708 New Jersey petitioned for a distinct administration, and Lewis Morris was appointed governor. The population was then about 40,000. Until the revolution New Jersey was the scene of no important event, and it was never much exposed to the ravages of the Indians. The last royal governor was William Franklin, the natural son of Benjamin Franklin. A state constitution was adopted in 1776, and throughout the revolution the country was frequently the theatre of war. The battles of Trenton, Princeton, Millstone, Red Bank, and Monmouth were fought on its soil. The first legislature met at Princeton in August, 1776, and chose William Livingston governor. The federal constitution was adopted by a unanimous vote, Dec. 18, 1787. The state capital was established at Trenton in 1790. The present constitution was ratified Aug. 13, 1844. In the summer of 1873 a board of 14 commissioners appointed by the governor agreed upon certain amendments to the constitution. Several of these were approved by the legislature of 1874; but before becoming a part of the constitution they must be approved by the legislature of 1875 and be ratified by the people at a special election held within four months after the dissolution of the legislature. New Jersey furnished 79,511 troops to the federal army during the civil war, or 55,785 reduced to a three years' standard. The legislature of 1870 refused to ratify the fifteenth amendment to the federal constitution, on the ground that the right to regulate suffrage was vested in the respective states. The first geological survey of New Jersey was made in 1839-'40 under the direction of Prof. Henry D. Rogers. A second survey was begun in 1854 by Dr. William Kittell, but was discontinued in 1856. The work was resumed in 1864, with Prof. George H. Cook as state geologist, and is still (1875) in progress. The results obtained up to 1868 are given in the "Geology of New Jersey" (1868) and annual reports. (See supplement.)

NEW JERSEY, College of. See PRINCETON.

NEW JERSEY TEA, the most common name for *ceanothus Americanus*, which is also called, in common with several other plants, red-root. The genus *ceanothus* (a name of unknown meaning), belonging to the buckthorn family (*rhhamnaceæ*), is represented in the Atlantic states by only four species, while on the Pacific coast there are about 20, several of which are large shrubs or small trees, others low prostrate mountain shrubs, and some have ever-green leaves. New Jersey tea is found from Canada to Florida, usually growing in dry woods as a low much-branched under-shrub, seldom over 3 ft. high; it has a dark red root; ovate, finely serrate, three-ribbed, very veiny leaves, which are downy beneath; and minute white flowers in dense clustered panicles. The flower has five-hooded petals on long claws, the same number of stamens, and a single pistil, which in fruit splits into three one-seeded



New Jersey Tea (*Ceanothus Americanus*).

carpels. It blooms in July, and so profusely as to be worthy of a place among ornamental shrubs. The leaves were among the many substitutes used for tea during the revolution. During the civil war they were used in some of the southern states, and were made the basis of an attempted fraudulent speculation at the north. It was announced that the true Chinese tea plant had been discovered in the mountains of a certain county in Pennsylvania, and its identity was certified to by an expert from Assam. After a time the prospectus of a company appeared, with engravings of the true tea leaf; but the fraud was soon exposed. An infusion of the leaves of New Jersey tea, prepared in the same manner as the true tea, has somewhat the taste of the commoner grades of the imported article, but it is probably quite destitute of any stimulating properties. The strong three-ribbed leaves distinguish it at sight from the true tea. The root has some astringency, and has been used in affections of the bowels, and to dye wool a

cinnamon color. A similar species, *C. ovalis*, has narrower, smooth leaves, pointed at both ends, and somewhat larger flowers. Some of the species of the far west are fine ornamental shrubs. *C. thyrsiflorus* is a small tree producing an abundance of light blue flowers, and known as the "California lilac." They are not hardy in the eastern states, though some of them succeed in England.

NEW JERUSALEM, the name applied in Rev. xxi. 2 to the city which John saw coming down from God out of heaven. Emanuel Swedenborg interprets this symbol as signifying the new church whose doctrines he was commissioned to teach. Hence the ecclesiastical organizations of his followers call themselves societies, &c., "of the New Jerusalem," or "of the New Church signified by the New Jerusalem." (For an account of their doctrines see SWEDENBORG, EMANUEL.) Swedenborg himself seems not to have contemplated the formation of such organizations, and gave no instructions for the purpose. In 1788, 16 years after his death, Robert Hindmarsh and others hired a chapel in London, and established public worship and preaching according to his doctrines. Their example was followed in other places, and about the beginning of the present century a general conference was formed of Swedenborgians in Great Britain, which in 1873 embraced 58 societies, containing altogether 4,019 members and 26 ministers; 24 of these societies, containing 2,147 members, were in Lancashire and the neighboring counties. The first Swedenborgian church in this country was formed in Baltimore in 1792; and in 1817 a general convention was called, which has met annually ever since, and in 1873 had connected with it 74 ministers and 93 societies, with 4,408 members, of whom 1,320 were in Massachusetts. There are besides a number of independent societies in the United States and on the continent of Europe, with an aggregate membership of perhaps 1,000. The denomination has no uniform liturgy or discipline, each society being left to itself, very much on the congregational system. Baptism (of infants as well as adults) and the Lord's supper are observed, and the worship and preaching resemble those of Protestants generally.

NEW KENT, a S. E. county of Virginia, bounded N. E. by the Pamunkey river, and S. W. by the Chickahominy; area, about 200 sq. m.; pop. in 1870, 4,381, of whom 2,361 were colored. Its surface is moderately uneven, and the soil light and sandy. The Richmond, York River, and Chesapeake railroad passes through it. The chief productions in 1870 were 20,719 bushels of wheat, 92,676 of Indian corn, 19,959 of oats, 8,600 lbs. of tobacco, and 5,122 gallons of sorghum molasses. There were 358 horses, 661 milch cows, 399 sheep, and 3,078 swine. Capital, New Kent Court House.

NEW LANARK. See LANARK.

NEW LEBANON, a town of Columbia co., New York, bordering on Massachusetts, on the

Harlem Extension railroad, 20 m. E. S. E. of Albany; pop. in 1870, 2,124. In the E. part is a large Shaker settlement (Mount Lebanon) of from 500 to 600 persons (including a few in the adjoining town of Canaan), owning about 4,000 acres of land. They have a large meeting house, a laboratory, a grist mill, five saw mills, a chair factory, two seed establishments, two machine shops, eight dwellings, a stone barn 196 by 50 ft., said to be the most perfect in the country, and seven other large barns. There are 26 buildings used as workshops. Their principal occupation is the raising and putting up of medicinal plants and garden seeds, the preparation of roots and extracts, and the manufacture of brooms and baskets. Of garden seeds and medicinal articles the annual production is about 200,000 lbs. The village of Lebanon Springs is a place of resort for its thermal springs, the largest of which discharges 16 barrels of water per minute. According to the analysis of Dr. Meade, a pint of the water contains 0.25 gr. chloride of calcium, 0.44 gr. chloride of sodium, 0.19 gr. carbonate of lime, and 0.37 gr. sulphate of lime. Gas, composed of 89.4 parts nitrogen and 10.6 parts oxygen, is constantly given out in the proportion of 5 cubic inches for every pint of water. The discharge of this spring supplies several baths, and keeps two or three mills running throughout the year. The waters have a uniform temperature of 73° at all seasons. There are several hotels. The town also contains an extensive establishment for the manufacture of medicinal extracts and pharmaceutical preparations, which makes its own glass ware; and it has the oldest thermometer factory in the United States.

NEW LEON. See NUEVO LEON.

NEW LONDON, a S. E. county of Connecticut, on Long Island sound, bordering on Rhode Island, bounded E. partly by the Pawcatuck and W. by the Connecticut river, and drained by the Thames river; area, about 650 sq. m.; pop. in 1870, 66,570. The surface is hilly, and in the southwest mountainous; the soil is best adapted to grazing. Fishing is extensively carried on. It is traversed by several railroads. The chief productions in 1870 were 16,846 bushels of rye, 247,362 of Indian corn, 174,300 of oats, 17,546 of buckwheat, 331,492 of potatoes, 64,441 tons of hay, 10,000 lbs. of tobacco, 64,738 of wool, 803,406 of butter, and 95,613 of cheese. There were 3,916 horses, 13,116 milch cows, 5,711 working oxen, 10,775 other cattle, 20,565 sheep, and 7,560 swine. There were 703 manufacturing establishments, with a capital of \$11,279,402, and annual products amounting to \$19,797,065, producing carriages and wagons, clothing, cotton goods, cotton thread, firearms, India-rubber goods, iron castings, machinery, paper, woollens, flour, and a variety of other articles. Capitals, New London and Norwich.

NEW LONDON, a city, port of entry, and one of the capitals of New London co., Con-

necticut, on the W. bank of the Thames river, 3 m. above its entrance into Long Island sound, and 40 m. S. E. of Hartford, in lat. 41° 18' 57" N., lon. 72° 5' 4" W.; pop. in 1850, 8,991; in 1860, 10,115; in 1870, 9,576. It is built on a declivity sloping S. and E., and the ground in the rear of the city rises to a considerable height. The streets were not originally laid out with much regularity, but have been greatly improved, and the new quarters are well graded. The private residences, owing partly to the influx of summer visitors who are attracted by the beautiful scenery of the neighborhood, are in many cases elegant and picturesque. The Pequot house, near the entrance of the harbor, has also made this city a fashionable summer resort. The Crocker house, recently built in the heart of the city, is one of the largest and best hotels in the state. Among the public buildings are a handsome granite custom house, a substantial and elegant brown-stone city building in which also the post office is situated, the court house, and the school houses and churches. The town has ample railroad communication by means of the New York, New Haven, and Hartford (Shore Line), the New London Northern, and the Stonington and Providence lines. There are two daily lines of steamers to New York. The largest wharf in New England is in course of construction at this port; it is 1,125 ft. long, 220 ft. wide at the river end, and 150 ft. at the shore end, at which vessels drawing 18 ft. may lie at low tide. The harbor is the best on Long Island sound, and one of the best in the United States. It is 3 m. long and 5 fathoms deep, sheltered by hills, seldom obstructed by ice, and defended by Fort Trumbull at the entrance. This fortress, which has been almost entirely rebuilt since 1840, is one of the best in the country, and mounts 80 pieces of heavy ordnance. It has accommodations for a garrison of 800 men. At the town of Groton, on the opposite side of the river, is Fort Griswold, the scene of the massacre by the British in 1781. (See GROTON.) On the E. bank of the Thames a United States navy yard is in course of construction. The inhabitants of New London have long been actively engaged in the whale fishery, in which the city ranks second only to New Bedford. Recently the seal fishery has been pursued by vessels from this port at Alaska and the South Shetland islands. The cod and mackerel fisheries for the New York and other markets are also important. There is some foreign and considerable coasting trade. The value of exports to foreign countries for the year ending June 30, 1874, was \$90,585; of imports from foreign ports, \$237,714. The number of entrances in the foreign trade was 30, aggregate tonnage 5,084; clearances 18, tonnage 3,026. The number of vessels engaged in the whale fishery was 17, of 2,735 tons; in the cod and mackerel fisheries 98, of 2,107 tons. The number of vessels belonging to the port was 191, with an aggregate tonnage of 20,624, viz.:

166 sailing vessels, tonnage 9,524; 24 steamers, 10,935; and 1 barge, 165. The town contains several iron foundries, machine shops, planing mills, a woollen and silk factory, &c. It has

five national banks, with an aggregate capital of \$975,000; graded public schools, including two high schools; a public library; a daily and a weekly newspaper; and eleven churches.—



New London.

New London was settled in 1649 by John Winthrop, son of the governor of Massachusetts. On Sept. 6, 1781, it was captured by a British force under Benedict Arnold, who set fire to the stores and shipping, and reduced the most valuable part of the town to ashes. They then attacked Fort Griswold at Groton, and massacred the garrison after it had surrendered. Fort Trumbull, not being tenable, as it was much exposed on the land side, had been evacuated.

NEW MADRID, a S. E. county of Missouri, bordering on the Mississippi river, by which it is separated from Kentucky and Tennessee, and intersected by White river; area, 880 sq. m.; pop. in 1870, 6,357, of whom 1,425 were colored. The surface is low and level, and in some places very productive. The remarkable earthquakes of 1811-'12 (see EARTHQUAKE, vol. vi., p. 361) severely injured this region, leaving a large portion of the land, now known as the "sunk country," under water. Various efforts have been made to reclaim the land. The county is intersected by the Cairo and Fulton railroad. The chief productions in 1870 were 3,990 bushels of wheat, 717,495 of Indian corn, and 2,875 of oats. There were 1,150 horses, 1,031 mules and asses, 1,744 milch cows, 699 working oxen, 2,064 other cattle, 465 sheep, and 13,172 swine. Capital, New Madrid.

NEWMAN, Edward, an English naturalist, born at Hampstead, May 13, 1801. He was a printer in London from 1840 to 1869, and published many popular scientific works. His "History of British Ferns" (1840), and "The Insect Hunters, or Entomology in Verse" (1858), have passed through several editions. Among his subsequent works are "Illustrated Natural History of British Moths" (1869), and "of British Butterflies" (1871).

NEWMAN. I. John Henry, an English clergyman, born in London, Feb. 21, 1801. He graduated at Trinity college, Oxford, in 1820, was elected a fellow of Oriel college in 1822, and there assisted Dr. Whately in preparing for publication the "Dialogues on Logic." He was ordained in 1824, in 1825 became vice principal of Alban Hall under Dr. Whately, and in 1826 a tutor of Oriel. He was appointed public examiner in 1827, and vicar of St. Mary's in 1828. In 1829 he opposed the reelection of Sir Robert Peel as member for the university of Oxford, because of that statesman's advocacy of Catholic emancipation. In 1830 he was chosen one of the select university preachers, and at the invitation of Hugh Rose began to write a history of the principal church councils, the first portion of which was published in 1833 under the title of "The Arians of the Fourth Century." Meanwhile the reform measures of Earl Grey, and the spread in England of German anti-dogmatic liberalism, gave rise to a strong conservative opposition in the English church, which Newman joined with the purpose of forming an Anglo-Catholic party. In December, 1832, he went to Italy with Hurrell Froude, and with him began in Rome the "Lyra Apostolica," which appeared monthly in the "British Magazine." Falling sick in Sicily, he returned to England in July, 1833. Soon after his arrival what is known as the "Oxford movement" was inaugurated by John Keble's sermon entitled "National Apostasy." Newman, finding that his associates differed widely as to the way of opposing liberalism and neutralizing the tendencies toward Rome, began the series called "Tracts for the Times," and a series of letters in the "Record" under the

heading of "Church Reform." He now wrote the historical sketches that appeared in the "British Magazine," and were afterward printed collectively as "The Church of the Fathers," aided in editing "The Library of the Fathers," and delivered lectures on "The Prophetic Office of the Church viewed relatively to Romanism and popular Protestantism" (London, 1837). In 1837 appeared his "Essay on Justification," controverting the Lutheran doctrine on that subject, while his "University Sermons" discuss the relation of faith and reason, and investigate the ultimate basis of religious belief. In the summer of 1838 he published a pamphlet on the "Real Presence," in which, seeking to give to the eucharistic doctrine an intellectual basis, he denied the objective reality of space. He now became editor of the "British Critic," and remained so till July, 1841. The bishop of Oxford having in 1838 animadverted publicly on the "Tracts for the Times," Dr. Pusey replied by denying their Romanizing tendencies. This opposition emboldened the tractarian writers, and Dr. Newman defined more and more clearly the relative positions of Anglicanism and Romanism, till his attempt to reconcile the Anglican teaching of the thirty-nine articles with Roman Catholic dogma culminated in Tract No. 90 in February, 1841. He was called upon to withdraw the tract, but refused. When the British and Prussian governments created a bishopric in Jerusalem (1841), he protested against the alliance about to be contracted in the East "with Nestorians, Monophysites, &c." In February, 1843, he made a formal retraction of the charges which he had uttered against the church of Rome, and in September gave up his living and resigned his office as a clergyman. To his house at Littlemore he had invited several persons whose minds were disturbed like his own, and this was represented as an attempted revival of monasticism. He busied himself and his associates with "Translations from Athanasius," and writing a series called "Lives of the English Saints," in order to give the writers "an interest in the English soil and the English church, and keep them from seeking sympathy with Rome." Some thirty writers were engaged in this work, the lives to form a periodical series with Dr. Newman as editor. The first two numbers only, containing the "Life of St. Stephen Harding" and "The Family of St. Richard," were edited by him, the others being published independently by their respective authors. He began his "Essay on the Development of Doctrine" in the beginning of 1845, was received into the Roman Catholic church Oct. 9, and left Oxford finally Feb. 23, 1846. Soon afterward Dr. Wiseman called him to Oscott, and thence sent him to Rome. There he took orders, and returning to England in 1848 established two houses of the Oratory of St. Philip Neri at Brompton and Birmingham, becoming superior of the latter, which in a few

years was transferred to Edgbaston. There he built a large convent and a spacious church, with a school for the sons of the gentry, and poor schools and other pious institutions in the neighborhood. He published in succession "Loss and Gain" (1848); "Sermons to Mixed Congregations" (1849); "Lectures on certain Difficulties felt by Anglicans in submitting to the Catholic Church" (1850); "Lectures on the Present Position of Catholics in England" (1851); and "Lectures on the History of the Turks in its relation to Christianity" (1853). In April, 1853, he was sued for libel by the ex-Dominican Achilli, and lost the suit, the costs of which were paid by public subscription. In 1854 he was appointed by the pope rector of the newly founded Catholic university of Dublin. Here, besides conducting the "Atlantis," the organ of the institution, he delivered several series of discourses and lectures on universities and university education, published in the collection of his works; "Sermons preached on Various Occasions" (1857); and "Callista, a Sketch of the Third Century." He resigned the rectorship of the university in 1859, and devoted himself to his labors and duties in the Oratory. Canon Kingsley having in "Macmillan's Magazine" for January, 1864, accused Dr. Newman and the Roman Catholic priesthood generally of thinking lightly of the virtue of veracity, a correspondence on this subject ensued, which was published in a pamphlet in February. This drew forth a second pamphlet from Kingsley, in which the imputation was renewed and aggravated. Dr. Newman replied in "Apologia pro Vita sua," issued in weekly numbers between April 21 and June 2, with an appendix on June 16, 1864. This work was afterward embodied in his "History of my Religious Opinions" (1865). In 1864 appeared "Verses on Various Occasions," and in 1865 "Letter to the Rev. E. B. Pusey, D. D.," in reply to some assertions in the latter's "Eirenicon," relative to the honors paid to the Virgin Mary. At the approach of the Vatican council a letter from Dr. Newman was published expressing dissatisfaction with the ultramontanes for urging factiously the definition of pontifical infallibility, but professing belief in the doctrine itself. In 1870 appeared a philosophical treatise entitled "An Essay in aid of a Grammar of Assent;" and in 1875, "A History of Arianism." In January, 1875, Dr. Newman published "A Letter addressed to his Grace the Duke of Norfolk, on occasion of Mr. Gladstone's recent Expostulation." A new uniform edition of Dr. Newman's complete works was begun in London in 1870, of which 25 volumes had been issued up to December, 1874. **II. Francis William**, an English author, brother of the preceding, born in London, June 27, 1805. He graduated at Worcester college, Oxford, in 1826, and in November became a fellow of Balliol college, which position he resigned in 1830, being unable conscientiously

to sign the thirty-nine articles previous to taking the degree of M. A. The three following years he spent in the East, and in 1834 he became classical tutor in Bristol college. In 1840 he was chosen classical professor at Manchester New college, and in 1846 professor of the Latin language and literature in University college, London, which office he resigned in 1863. In his works on theological subjects he has taken an exactly contrary course to that of his brother. Among them may be mentioned "Catholic Union: Essays toward a Church of the Future and the Organization of Philanthropy" (8vo, 1844); "A State Church not Defensible," a tract (1846); "A History of the Hebrew Monarchy, from the Administration of Samuel to the Babylonish Captivity" (1847); "The Soul, its Sorrows and Aspirations" (1849); "Phases of Faith, or Passages from the History of my Creed" (1850); and "Theism, Doctrinal and Practical" (1858). His other works include "Four Lectures on the Contrasts of Ancient and Modern History" (1847); "An Appeal to the Middle Classes on the urgent Necessity of numerous Radical Reforms, Financial and Organic" (1848); "On the Constitutional and Moral Right or Wrong of our National Debt" (1849); a tract on "The Crimes of the House of Hapsburg against its own Liege Subjects" (1851); "Lectures on Political Economy" (1851); and "Regal Rome, an introduction to Roman History" (1852). He has also published "A Collection of Poetry for the Practice of Elocution" (1850); "Odes of Horace translated into unrhymed Metres" (1853); "The Iliad of Homer translated into unrhymed Metres" (1856); "Homeric Translation in Theory and in Practice" (1861); "Text of the Iguvine Inscriptions" (1864); "The English and their Reforms" (1865); "A Handbook of Modern Arabic" (1866); "Miscellanies, Academical and Historical" (1869); "The Cure of the great Social Evil, with special reference to recent laws, delusively called Contagious Diseases Acts" (1869); "Orthoëpy, or a simple Mode of accenting English" (1869); and "Europe of the near Future, with three Letters on the Franco-German War" (1871). He assisted in editing a translation of Huber's work on "The English Universities" (1843), and in 1853 brought out an edition of the "Select Speeches of Kossuth." He is likewise author of "Lectures on Logic," of a "Grammar of the Berber Language," and of a work on the "Difficulties of Elementary Geometry." He has in preparation (1875) an English-Arabic dictionary in Roman type, on a new plan.

NEWMARKET, a market town of England, consisting mainly of one long street, wide and well lighted, the N. side of which is in Suffolk and the S. side in Cambridgeshire, 13 m. E. by N. of Cambridge, and 56 m. N. E. of London, with which it is connected by the Eastern Counties railway; pop. in 1871, 4,534. It contains a corn market, assembly rooms, a handsome church, several schools, and a jockey

club. There are 15 establishments for training horses, which is the principal business of the place. It derives its chief importance from the races, seven of which are held annually, viz.: the Craven and the first and second spring meetings, in April and May, at fortnightly intervals; the July; and the first and second October meetings and the Houghton, in October, a fortnight apart. The race course, considered the best in Great Britain, is about 3 m. from the town, and between 4 and 5 m. in circuit. There is also a training ground about 1½ m. long. In the principal church is a monument to Frampton, who was trainer to Queen Anne and to George I. and II. Near Newmarket is Chippendale park, with fine pleasure grounds. An old Roman intrenchment, called the Devil's ditch, runs directly across the heath upon which the race course is situated.

NEWMARKET CAVE. See supplement.

NEW MEXICO, a territory of the United States, situated between lat. 31° 20' and 37° N., and lon. 103° and 109° W.; length on the E. boundary 345 m., and on the W. boundary 390 m.; average breadth N. of the 32d parallel, 335 m.; area, 121,201 sq. m. It is bounded N. by Colorado, E. by Indian territory and Texas, S. by Texas and Mexico, and W. by Arizona. The territory is divided into 13 counties, viz.: Bernalillo, Colfax, Doña Ana, Grant, Lincoln, Mora, Rio Arriba, San Miguel, Santa Ana, Santa Fé, Socorro, Taos, Valencia. Santa Fé, the capital, had 4,765 inhabitants in 1870. The principal other places are Albuquerque, Cimarron, Fernando de Taos, Las Cruces, Las Vegas, Mesilla, Mora, Placita, and Silver City, each having more than 1,000 inhabitants. The population of the territory, according to the federal censuses, has been as follows: 1850, 61,547; 1860, 93,516; 1870, 91,874, of whom 172 were colored and 1,309 non-tribal Indians. The apparent decrease between 1860 and 1870 is due to the setting off of territory to form Arizona and a portion of Colorado. Making allowance for the inhabitants thus transferred, there was an actual increase within the present limits of New Mexico of about 20,000. Next to the District of Columbia it is the most populous territory in the Union. Of the total population in 1870, 86,254 were native and 5,620 foreign born, 47,135 males and 44,739 females. Of the natives, 83,175 were born in the territory; of the foreigners, 3,913 were born in Mexico. The number of male citizens of the United States 21 years old and over residing in the territory was 22,442. There were 21,449 families, with an average of 4.28 persons to each, and 21,053 dwellings, with an average of 4.36 to each. There were 48,836 persons 10 years old and over who could not read, and 52,220 who could not write; of the latter 49,311 were natives and 2,909 foreigners, 23,779 males and 28,441 females; 9,718 were from 10 to 15 years of age, 10,005 from 15 to 21, and 32,497 were 21 years old and upward, of whom 15,031 were males.

The number of blind persons was 159; deaf and dumb, 48; insane, 50; idiotic, 46. There were 24 convicts in prison on June 1, 1870; number of persons convicted of crimes during the preceding year, 95. Of the whole number (29,361) 10 years old and upward returned by the census as engaged in all occupations, there were employed in agriculture 18,668, including 10,847 agricultural laborers and 7,629 farmers and planters; in professional and personal services, 7,535, including 51 clergymen, 1,365 domestic servants, 3,348 laborers, 48 lawyers, 27 physicians and surgeons, 1,116 United States soldiers, and 49 teachers; in trade and transportation, 863; in manufactures and mining, 2,295. Nearly all the inhabitants are of Mexican descent and speak the Spanish language. Much of New Mexico, especially the S. and W. parts, has until recently been subject to Indian incursions, and the Apaches in the south are still somewhat troublesome. The number of tribal Indians (not included in the census) in the territory in 1874, according to the report of the United States commissioner of Indian affairs, was 25,268, viz.: Navajos, occupying a reservation of 5,400 sq. m. in the northwest, partly in Arizona, 9,068, besides 2,000 not on the reservation; Mescalero Apaches, with an agency at Fort Stanton in the southeast, 1,800; Southern or Gila Apaches, on a reservation near the hot springs in the southwest, 400; Capote Utes (500), Weeminuche Utes (750), and Jicarilla Apaches (500), of the Abiquiu or Tierra Amarilla agency, about 100 m. N. W. of Santa Fé, 1,750; Muache Utes (290) and Jicarilla Apaches (460), of the Cimarron agency in the northeast, 750; Pueblos, occupying 19 pueblos or villages in the N. W. part of the territory, 9,500. The Pueblos have several times been decided by the territorial courts to be citizens of the United States, but have preferred to retain their tribal organization, each village having its own government. (See PUEBLO INDIANS.)—The general surface of New Mexico consists of high level plateaus, traversed by ranges of mountains, between which are many broad fertile valleys, and from which rise occasional isolated peaks of great height. The valley of the Rio Grande has an elevation of between 5,000 and 6,000 ft. above the sea near the N. boundary, 4,800 ft. at Albuquerque (lat. 35°), and 3,000 ft. at El Paso, Mexico, near the S. boundary of the territory. The general altitude of the mountain ranges on each side of the valleys of the Rio Grande and the Pecos is between 6,000 and 8,000 ft. above the sea, sometimes, especially in the north, rising to 10,000 or 12,000 ft., the summits being covered with perpetual snow. Mt. Taylor in the Sierra Madre range, S. W. of Santa Fé, rises 10,000 ft. above the valley of the Rio Grande. The general direction of the mountains and streams is from N. to S. The Rocky mountains before entering the territory from Colorado are divided into two ranges. The eastern, formed by lofty peaks and high

continuous ridges, terminates abruptly a few miles S. of Santa Fé; the western, called the Sierra Madre, consists of many detached mountains of less height, with low passes between them, and forms the connecting link with the Sierra Madre of Mexico. Nearly two thirds of the territory lies E. of the Sierra Madre. S. of the termination of the E. range of the Rocky mountains a lofty plateau extends between the Rio Grande and Pecos, interrupted by numerous minor ranges of mountains. The region W. of the Sierra Madre has been imperfectly explored, but is known to contain table lands or *mesas* (often standing apart from each other and bearing great resemblance to gigantic fortresses and castles) and detached ranges of mountains, with many fertile valleys and occasional peaks of extinct volcanoes. E. of the Pecos river and the E. range of the Rocky mountains the country slopes gradually toward the Mississippi river and the gulf of Mexico. The S. E. part of the territory is occupied by the W. portion of the Llano Estacado or Staked Plain, an elevated tract destitute of wood, and of any vegetation except immediately after rain, of which the fall here is slight.—The principal river is the Rio Grande del Norte, which, rising in Colorado and entering New Mexico between the Sierra Madre and the E. range, flows S. through the entire territory, and, after forming the boundary between Texas and Mexico, enters the gulf of Mexico. The Pecos rises on the E. slope of the E. range, flows S. through the E. portion of the territory, and joins the Rio Grande in Texas. These two rivers have many small tributaries, chiefly from the west. The largest of those of the Rio Grande are in the N. part of the territory. The N. E. section is drained by the head waters of the Canadian, a branch of the Arkansas, and the N. W. corner by the San Juan, a tributary of the Colorado of the West. In the southwest are the sources of the Gila, and here also is the Rio de los Mimbres, which flows S. into Mexico. The central portion of the region W. of the Rio Grande contains the sources of the Colorado Chiquito or Little Colorado, which flows N. W. and joins the Colorado of the West in Arizona.—Most of the mountains of the central plateau between the Rio Grande and Pecos are composed chiefly of syenitic rocks, which during their upheaval broke through palæozoic sandstones and carboniferous limestones. The limestones are found generally on the flanks of the ridges, but sometimes on their tops. Both the syenites and carboniferous limestones are traversed by mineral lodes. Dikes of porphyry are frequently met with near the lines of intersection. The plateau itself has underlying it for the most part tertiary and lower cretaceous rocks. The sandstone frequently forms table mountains or *mesas*, and contains in many localities beds of lignite and bituminous coal, 2 to 5 ft. thick, alternating with layers of iron ore, fire clay, and shales. The latter are frequently filled with large fossil leaves. Where-

ever eruptions and overflows of porphyry have acted upon the formations containing coal, the latter has been completely metamorphosed into anthracite of excellent quality. Variegated marls and beds of gypsum are exposed in many localities on this plateau. W. of the Rio Grande the same formations are met with. The extensive layers of lava, spread in several localities horizontally upon the sandstone strata, are a characteristic feature of the geology of New Mexico. Many of the streams flow through deep cañons, that of the Rio Grande W. of Taos being more than 1,000 ft. deep, with perpendicular walls. Mines of anthracite have been opened at the Old Placer mountains. There are hot and mineral springs in many portions of the territory, possessing curative properties. Salt lakes (*salinas*) are numerous, particularly between the Rio Grande and Pecos, S. of Santa Fé; they furnish a large portion of the supply of salt for the territory and adjacent portions of Mexico. The precious metals and copper are abundant, and mines of these were worked in Spanish and Mexican times; more recently lack of capital, want of water in many districts, and Indian hostilities have retarded their development. The annual product of gold for several years past, according to the United States commissioner of mining statistics, has been about \$500,000. The principal mines are those of the Moreno gold fields in Colfax co., on the E. slope of the Rocky mountains, in the N. part of the territory; of the Pinos Altos district in Grant co., in the S. W.; and of the Old and New Placer mountains in Santa Fé and Bernalillo cos. There are also gold mines in the Sierra Blanca, Carrizo, Patos, and Jicarilla mountains in Lincoln co.; in the Magdalena mountains in Socorro co.; in Rio Arriba and Taos cos., N. and N. W. of Santa Fé; and in other places. These are chiefly placer mines, but quartz lodes are worked at some points to a limited extent. Silver is not now largely mined, but there are deposits of it at Pinos Altos, in the Organ mountains in the south, in the Cerillos and Sandia mountains near the centre of the territory, in the Magdalena mountains, and in other places. Copper is found in the Pinos Altos region, where one mine is in operation, yielding about 9,000 lbs. of metal a week; in the Manzano mountains, in Bernalillo and Valencia cos.; in the Mogollon mountains, near the Arizona border; in the Magdalena mountains, and elsewhere. Lead occurs in the Pinos Altos mines, in the Organ mountains, and in other parts of the territory. Iron is found at the Moreno mines, in the Placer mountains, near Pinos Altos, and near Embudo, between Santa Fé and Taos, as well as at other points. Zinc, manganese, quicksilver, and other minerals occur. The census of 1870 returns 17 mines (all gold), of which 12 were placer and 5 quartz; number of hands employed, 177; capital invested, \$2,384,000; wages paid during the year, \$107,550; value

of materials used, \$33,138; of products, \$343,250. The amount of gold from New Mexico deposited at the United States mints and assay offices to June 30, 1874, was \$1,004,755 72; of silver, \$239,574 49.—The climate varies much. Near Santa Fé and in the mountains the winter is severe. N. of Santa Fé the days are never sultry and the nights are always cool. In the south the temperature is mild, being seldom below the freezing point, and rarely rising to extreme heat, owing to the elevation of the surface. The sky is generally clear and the atmosphere dry, so that meat may be preserved for a long time without salt. In the south the rainy season is in July and August. The annual rainfall varies from 10 to 30 inches in different localities. The mean temperature at Santa Fé (lat. 35° 41', elevation 6,862 ft.) for six years has been as follows: spring, 49·7°; summer, 70·4°; autumn, 50·6°; winter, 31·6°; year, 50·6°. For the year ending Sept. 30, 1873, the mean temperature at the same place was 49°; of the warmest month (July), 71°; of the coldest month (January), 29°; total rainfall, 8·59 inches; greatest monthly rainfall (August), 2·79 inches. The highest temperature observed during the calendar year 1873 was 88°; lowest, —5°. The diseases are few. Inflammations and typhoid fevers sometimes appear in the winter season; rheumatism is more prevalent, arising doubtless from the common practice of sleeping on the ground. Pulmonary complaints are scarcely known. The number of deaths in 1870 was 1,180, of which 420 were from general diseases (including 36 from scarlet fever, 11 from typhus fever, 90 from enteric fever, 12 from intermittent fever, 31 from remittent fever, 39 from rheumatism, and 45 from consumption), 60 from diseases of the nervous system, 33 of the circulatory system, 305 of the digestive system, 161 of the respiratory system (including 63 from pneumonia), and the rest from miscellaneous causes. The proportion of deaths from consumption was smaller than in any state or territory except Arizona.—The valleys of nearly all the streams and such portions of the table lands as are within the reach of irrigation are very productive. The most important agricultural regions are the valleys of the Rio Grande and Rio Pecos, which are generally from 1 to 4 m. wide, the former expanding in places to 10 or 15 m. Owing to the slight fall of rain, artificial irrigation is necessary. The supply of water is obtained by constructing from the streams, at the general cost, large canals, called *acequias madres*, of sufficient capacity for an entire settlement, from which each farmer constructs a minor canal to his own land. Some of these main canals are 20 or 30 m. long. Large portions of the table lands too remote or elevated to be irrigated from the streams possess a fertile soil. Whether a supply of water for their irrigation can be obtained by artesian wells or otherwise remains undetermined. Agriculture

is mostly carried on in a very primitive manner. The principal crops are Indian corn, wheat, barley, oats, apples, peaches, melons, apricots, and grapes. The territory is especially adapted to the culture of the grape, the yield of fruit being abundant, and the wine produced of excellent quality. Potatoes do not generally thrive, but cabbages, onions, pumpkins, &c., grow well; and in the south quinces, pomegranates, and figs may be raised. The country is better adapted to stock raising than farming. Large tracts, where agriculture is not practicable, afford abundant pasturage. Owing to the mildness of the climate, artificial shelter is never required. The valleys, foot hills, and table lands are covered with nutritious grasses, the most valuable variety being the mezquite or grama grass, which preserves its nutritive properties and furnishes abundant food throughout the winter. Sheep raising is one of the chief industries of the territory; the flocks are almost entirely free from disease and require little care. The principal forests are confined to the mountain ranges, and consist chiefly of pine, cedar, spruce, and other evergreens. On the foot hills there are extensive tracts of *piñon* or nut pine and cedar, and along the margins of the streams belts of cottonwood, sycamore, and other deciduous trees, while in the south groves of oak and walnut are abundant. The principal wild animals are the deer, mountain sheep, antelope, elk, cougar, ocelot, lynx, bear, coyote, wolf, weasel, hare, squirrel, and beaver. Wild turkeys, geese, ducks, sage hens, prairie chickens, &c., occur.—The number of acres of improved land in farms in 1870 was 143,007; number of farms, 4,480, of which 1,345 contained less than 10 acres each, 1,172 from 10 to 20, 1,293 from 20 to 50, 358 from 50 to 100, 299 from 100 to 500, 9 from 500 to 1,000, and 4 more than 1,000; cash value of farms, \$2,260,139; of farming implements and machinery, \$121,114; amount of wages paid during the year, including the value of board, \$523,888; estimated value of all farm productions, including betterments and additions to stock, \$1,905,060; value of orchard products, \$13,609; of produce of market gardens, \$64,132; of forest products, \$500; of home manufactures, \$19,592; of animals slaughtered or sold for slaughter, \$224,765; of live stock, \$2,389,157. The productions were 338,930 bushels of spring wheat, 13,892 of winter wheat, 42 of rye, 640,823 of Indian corn, 67,660 of oats, 3,876 of barley, 10 of buckwheat, 28,856 of peas and beans, 3,102 of Irish potatoes, 8,587 lbs. of tobacco, 684,930 of wool, 12,912 of butter, 27,239 of cheese, 19,686 gallons of wine, 813 of milk sold, 1,765 of sorghum molasses, and 4,209 tons of hay. The live stock consisted of 5,033 horses, 6,141 mules and asses, 16,417 milch cows, 19,774 working oxen, 21,343 other cattle, 619,438 sheep, and 11,267 swine. There were also 21,467 horses and 128,767 cattle not on farms. The number of manufacturing establishments

was 182, having 13 steam engines of 252 horse power, and 42 water wheels of 659 horse power; number of hands employed, 423; capital invested, \$1,450,695; wages paid during the year, \$167,281; value of materials used, \$880,957; of products, \$1,489,868. The only important establishments were 36 flouring and grist mills, value of products \$725,292; 12 saw mills, \$121,225; and 7 quartz mills, \$399,712. There are no railroads in operation in the territory, but several lines are projected through it. The Texas and Pacific, in progress in Texas, is to pass through the S. portion; the Atchison, Topeka, and Santa Fé is in progress from Granada, Colorado, its present terminus, to Santa Fé, through the N. E. portion of the territory; and the Denver and Rio Grande, in operation to Pueblo, Colorado, and still in course of construction, is intended to pass down the valley of the Rio Grande. The projected line of the Atlantic and Pacific railroad passes through New Mexico along the 35th parallel, but no progress has been made since its completion some years since to Vinita, Indian territory. There are two national banks at Santa Fé, with a joint capital of \$300,000.—The executive power is administered by a governor and secretary, appointed by the president with the consent of the senate for four years, and by an auditor, treasurer, adjutant general, and attorney general, chosen by the territorial legislature. This body consists of a council of 13 and a house of representatives of 26 members, elected by the people for two years. The judicial power is vested in a supreme court, with appellate jurisdiction; district courts, with general original jurisdiction; probate courts, and justices of the peace. The supreme court is held by three judges, appointed by the president with the consent of the senate. The district courts (one in each of the three judicial districts into which the territory is divided) are held by a single judge of the supreme court. There is a probate court for each county. The valuation of property, according to the United States censuses, has been as follows:

YEARS.	ASSESSED VALUE.			True value of real and personal property.
	Real estate.	Personal property.	Real and personal.	
1850...	.....	.....	.....	\$5,174,471
1860...	\$7,018,260	\$13,820,520	\$20,838,780	20,813,768
1870...	9,917,991	7,866,023	17,784,014	81,349,798

The total taxation in 1870 was \$61,014, of which \$34,115 was territorial, \$26,101 county, and \$798 town, city, &c. There was no territorial debt at that date. The receipts into the territorial treasury in 1874 were \$46,317 82; expenditures, \$43,361 59.—Prior to 1871 there were no public schools in the territory. In that year a law was passed organizing a system of free public schools, and placing them under the management of a board of supervi-

sors and directors for each county, consisting of three persons elected biennially, with the probate judge of the county as *ex officio* president of the board. The school fund consists of 25 per cent. of the entire tax on property, a poll tax of \$1 on every male citizen above the age of 21 years, and any "surplus of more than \$500 in the treasury of any county after paying the current expenses of such county." The statistics of the schools for 1873 are as follows:

CLASS OF SCHOOLS.	Number of schools.	Pupils.	Teachers.	Average number of months taught.	Income.
Public schools supported by taxation.....	183	5,625	186	6½	\$29,721 57
Private schools.....	26	1,370	53	9	27,100 00
Pueblo schools.....	5	107	7	6	4,000 00
Total.....	164	7,102	196	....	\$60,821 57

Of the public schools, 10 were taught in English, 111 in Spanish, and 12 in both languages. The Pueblo schools were all English. Of those classed as private several are conventual and other Catholic schools; 7 were English and 19 mixed. According to the census of 1870, the number of schools of all kinds was 44, with 72 teachers, 1,798 pupils, and an income of \$29,886. In the same year there were 116 libraries with 39,425 volumes, of which 83 with 29,805 volumes were private. Of those not private, 24 were church libraries, with 3,250 volumes; 3 Sabbath school, 760; 2 school, college, &c., 1,200; 2 court and law, 210; 1 territorial, 4,000; and 1 circulating, 200. The number of church organizations was 158, with 152 edifices, 81,560 sittings, and property to the value of \$322,621. Of these, 152 organizations, with 149 edifices, 80,710 sittings, and property to the value of \$313,321, were Roman Catholic. There were also a Baptist, a Methodist, a Presbyterian, and three Episcopal organizations. In 1874 one daily (English and Spanish) and 11 weekly (5 English and 6 English and Spanish) newspapers and one semi-monthly periodical were published.—New Mexico was among the earliest of the interior portions of North America visited by the Spaniards; and distant as it is from the sea, the adventurous spirit of that people led them here nearly a century before the English had landed on the shores of New England. Alvar Nuñez (Cabeça de Vaca), with the remnant of those who accompanied Narvaez to Florida, reached New Mexico before 1537, and made a report to the viceroy of Mexico of what they saw. The expedition of Marco de Niza followed in 1539, and that under Coronado the next year. The latter traversed the country N. of the Gila occupied by the Pueblo Indians, and pushed his way eastward beyond the Rio Grande to the country of the *cibola* or bison, and is the first who speaks of that animal, which he calls "a new kind of

ox, wild and fierce, whereof the first day they killed fourscore, which sufficed the army with flesh." The great prairies and desert plains of New Mexico are so truthfully described by Castaneda, the historian of the expedition, that no doubt remains of his having crossed the entire country. In 1581 other adventurers under Capt. Francisco de Bonillo reached the country, and on their return made known the mineral wealth existing there, which caused the name of New Mexico to be applied to it. About this period Agustin Ruiz, a Franciscan missionary, entered the country, and was soon after murdered by the Indians. A more successful official of the government was Don Antonio Espejo, who took with him a body of men to protect the missions. The viceroy of Mexico sent Juan de Oñate to take formal possession of the country in the name of Spain, and to establish colonies, missions, and forts there. The year of his arrival is by some writers stated to be 1595, by others 1599. The missionaries met with great success in Christianizing the native tribes. The Pueblo Indians were more ready to adopt the new faith than the roving tribes; and it is a singular fact that on rediscovering some of these Pueblos, when they had been without any priest for nearly a century, many of the Christian rites and doctrines were found among them, though strangely blended with their own religion. Espejo found the people considerably advanced in civilization. They wore garments of cotton of their own manufacture. Their arms were large bows, and arrows terminated with sharp-pointed stones; their long wooden swords were also armed with sharp stones. They carried shields made of the raw hides of bison. Some of the people lived in stone houses several stories high, the walls of which were ornamented with pictures; these lived in the valleys and cultivated the soil. In the villages were seen a great many idols, and in every house was a chapel dedicated to some evil genius. Oñate is said by historians to have been the most successful of all the officials sent to New Mexico. Many new missions were established, mines were opened and worked, and the country was in a flourishing state. But the enslavement of the Indians by the colonists, who compelled them to labor in the mines, was too much for them to bear. They made several ineffectual efforts to rid themselves of their oppressors, and finally in 1680 drove out the Spaniards, and recovered the whole country as far south as El Paso del Norte. It was not until after several attempts that the Spaniards regained possession of the country in 1698. In 1846 Santa Fé was taken by a United States force under Gen. Kearny, who soon after conquered the whole territory from Mexico. In 1848 it was ceded to the United States by the treaty of Guadalupe Hidalgo. A territorial government was organized by the act of Sept. 9, 1850. The region S. of the Gila river, known as the Gadsden

purchase, was obtained from Mexico by the treaty of Dec. 30, 1853, and was annexed to New Mexico by the act of Aug. 4, 1854. The territory then contained, besides the region within its present limits, the whole of Arizona and a portion of Colorado and Nevada. The tract (about 14,000 sq. m.) E. of the Rocky mountains and between the 37th and 38th parallels was annexed to Colorado by the act of Feb. 28, 1861. Arizona was set off by the act of Feb. 24, 1863; and by the act of May 5, 1866, the N. W. corner of Arizona was annexed to Nevada. The question of the admission of New Mexico as a state has several times been before congress. At the close of the 43d congress, March, 1875, a bill for its admission failed to become a law.—See "New Mexico," by Elias Brevort (Santa Fé, 1874). (See supplement.)

NEW MILFORD, a town of Litchfield co., Connecticut, on the Housatonic river and railroad, 40 m. W. by S. of Hartford; pop. in 1870, 3,586. The principal village, on the left bank of the river, is neatly laid out with wide and well shaded streets, has a handsome common, and is supplied with pure water. It has a national bank, a savings bank, a weekly newspaper, a court room for the sessions of the district court, four churches, and about 25 stores. It is the centre of the tobacco trade of the entire valley, and has 10 warehouses; it also contains manufactories of paper, buttons, and woollen cloths.

NEW ORLEANS (Fr. *La Nouvelle Orléans*), the capital, chief city, and commercial metropolis of Louisiana, the ninth city of the United

States in point of population, nearly coextensive with the parish of Orleans, situated on both banks (but chiefly on the left) of the Mississippi river, 100 m. above its mouth, and 960 m. in a direct line S. W. of Washington; lat. of custom house, 29° 57' N., lon. 90° W. The river here has a general E. and W. direction. The older portion of the city is built on the left bank, on the convex side of a bend of the river, from which circumstance it derives its familiar sobriquet of the "Crescent City." In the progress of its growth up stream, it has now so extended itself as to follow long curves in opposite directions, so that the river front on the left bank presents an outline somewhat resembling the letter S, and 11 or 12 m. in extent. The city includes, on the left bank, the town of Carrollton, formerly belonging to the parish of Jefferson, and the whole of the parish of Orleans, except the portion lying between Bayou Chef Menteur and the Rigolets pass; and on the right bank, the town of Algiers. The greater portion of this region is not built up, but consists of market gardens, swamps, canebrakes, and bayous. The boundaries of the city on the left bank are: on the west, the upper line of Carrollton and the line of the old Jefferson and Lake railroad; on the north, Lake Pontchartrain; on the east, Bayou Chef Menteur; and on the south, Lake Borgne, Bayou Bienvenu, Fisher's or Fisherman's canal, and the Mississippi. On the right bank, Algiers is bounded N. E. by the Mississippi river and by the line of Ptolemy street, running southeasterly (nearly as a continuation of Canal street on the left bank),



New Orleans.

and by other lines zigzagging more easterly, and terminating at Point Becca on the Mississippi. That portion of the parish of Orleans which alone has not been included in the city consists of a series of islets called Les Petites Coquilles, from the extent to which

small shells enter into the composition of their soil. These islets surround a body of water from Lakes Pontchartrain and Borgne which is called Lake Catharine. At the Pontchartrain end of the Rigolets pass, on one of these islets, stands Fort Pike; on another, at the

Lake Borgne end of the Rigolets, stands Fort Macomb. Near the western border of Bayou Chef Menteur stands Fort Wood. Fort Pike is in lat. $30^{\circ} 10' N.$, lon. $89^{\circ} 38' W.$, about 30 m. from the centre of the drainage sections of the city. Fort Wood is in lat. $30^{\circ} 8' N.$, lon. $89^{\circ} 51' W.$ Fort Macomb is about 6 m. S. E. of Fort Pike, and is virtually if not actually abandoned. Fort Pike, being surrounded by salt water, is healthy, while Fort Wood, standing in the midst of marshes, is very insalubrious. From the western boundary of the city to the northeastern (that is, from Carrollton upper line to Bayou Chef Menteur) the distance is about 22 m.; greatest breadth, at the N. E. extremity, nearly 10 m.; breadth from the lake to the river, in the drainage sections, $7\frac{1}{2}$ m.; least breadth, from Lake Pontchartrain to Bayou Bienvenu, about 5 m.; total area of the present statutory city, about 150 sq. m. The actual city, however, is comprised within the drainage sections, of which not more than one half is closely inhabited, while the other half comprises much that is but barely redeemed from original swamp. These sections cover an area of 26,026 acres, or about $40\frac{3}{4}$ sq. m. They are bounded by lines which have been run for a contemplated protection levee, and by the river. The W. line is the upper line of the city from the river to the lake, a distance of nearly $5\frac{1}{4}$ m.; the N. line skirts the shore of the lake for nearly $4\frac{1}{2}$ m.; the E. line is irregular, running from the lake to the river, a total distance of about $7\frac{3}{4}$ m. It is proposed to make this protection levee sufficiently broad at the top to form a good road. On the lake shore considerable progress has already been made, the levee along the river having long since been built. The region enclosed by these lines is lower than the surface of the Mississippi at high water, and besides has a slight general declination toward the lake. Somewhat further back than its centre it is crossed by an irregularly curved ridge, called the Metairie ridge on the W. side of the bayou St. John, and the Gentilly ridge on the E. side. Along these ridges run a bayou and a road bearing the same name, but the bayou Gentilly is better known, at least in its eastern course, as the bayou Sauvage, the name originally given to it. The bayou St. John, running southerly, from about the centre of the protection levee line along the lake, for a distance of nearly 4 m., is continued by the Carondelet canal some 2 m. further in a southeasterly direction to what is known as the Old basin, which stands at the end of Toulouse street, at a distance of about half a mile from the river. About two fifths of a mile from the W. extremity of the lake protection line the New Orleans canal, generally called the New canal, starts parallel to the bayou St. John, and runs S. and S. E. about $6\frac{1}{2}$ m. into what is known as the New basin at the end of Julia street, about three quarters of a mile from the river. Connected with these bayous and canals are a number of others by

means of which the city within the limits we are considering is drained. Many new ones are contemplated, several have lately been constructed, old ones have been lengthened, deepened, and otherwise improved, and some useless or objectionable ones have been filled up. By the bayou St. John and the New canal small vessels bring large quantities of articles from Mobile, Pensacola, the lake shores, and their vicinities. These are, besides some cotton, principally lumber, shingles, sand, shells, bricks, tar, oysters, wood, charcoal, fire clay, and garden produce. As many as 50 or 60 vessels have been seen in the basins at the same time. Some of these are large schooners, and a few small stern-wheel steamboats have plied among them. North of the Metairie bayou, near the western protection levee line, was the famous Metairie race course; and south of the bayou, somewhat nearer the levee line, is the Oakland race course. On the same ridge, between the New canal and the bayou St. John, somewhat nearer the latter, is the old city park. Here are numbers of fine large oaks and other trees, as there are also around the race courses and more or less along the whole ridge. This park has never had any proper attention paid to it, and is now but little frequented. A little east of the bayou St. John, on the Gentilly ridge, is a spot called the fair grounds, where periodical fairs, generally annual ones, are held. There is a race course here also.—The streets of New Orleans, in width, length, and general appearance, are second to those of no city of its size. As far back as Claiborne street, those running in general parallelism with the river and with each other present an unbroken line from the lower to the upper limits of the city, a distance of about 12 m. Those at right angles to them, or rather to the levee, run from the Mississippi toward the lake with more regularity than might be expected from the very sinuous course of the river. Claiborne, Rampart, St. Charles, Elysian-fields, Esplanade, and Canal streets are about 200 ft. wide, with a banquette or sidewalk about 12 ft. wide on each side, a central portion 25 ft. wide bordered on each side by a row of trees and a sidewalk of ample width, and a wide road between this central ground and each of the main banquettes. On the central portion railroad tracks are laid for several lines of street cars. In Canal street there are many very fine stores and some fine private residences. A number of streets are substantially paved with oblong granite blocks about a foot square by two feet long. Some of them are shelled, and afford very pleasant driving; but many are unpaved and in very wet weather scarcely available, and in dry weather intolerably dusty. Some of the finest streets in the city are in this condition, as Jackson street, and St. Charles street in the greater length of its upper portion. There are ten public squares in the city, counting as such Tivoli circle and the polyhedral oblong Coliseum place. With the exception of Jackson

square and Douglas square, which are highly cultivated and well kept, trees and lawns constitute the only horticultural cultivation these squares exhibit. Most of them are enclosed with iron railings, but some are barely more than in embryo. In Lafayette square a fine white marble statue of Franklin, of life size, executed by Hiram Powers, has been erected. A colossal bronze statue of Henry Clay, by Hart, in Canal street, and that of Jackson in Jackson square, are the only others in the city. All parts are traversed by street railroads, extending in all directions between the river and the ridge, from the upper to the lower line of the city. There are over 20 lines, all of which, with one exception, have one terminus in Canal street.—Chief among the public buildings is the custom house, in which are also the United States marshal's office and the post office. It was commenced 27 years ago, and is an extensive and solid structure, covering a whole square, and built of massive blocks of granite, with immense pillars of white marble and heavy iron staircases, and other fittings correspondingly substantial. The post office, the fitting up of which has lately been completed, is one of the most elegant and commodious in the country. The St. Charles hotel, covering half a square, surpasses the custom house in elegance of front and of entrance, with its spacious balcony and portico, lofty and handsome Corinthian pillars, and large and tasteful rotunda. The city hall, situated in St. Charles street, opposite Lafayette square, is perhaps the most artistic of the public buildings of the city. It is in the Ionic order, principally of marble, with a wide and high flight of steps leading to an elegant portico supported by eight columns. The mint is in the Ionic order, covering about the same area as the city hall, but not so handsome. No coining has been done there since the war, but congress has taken steps to recommence operations. The United States assistant treasurer has his office there. The view presented by the St. Louis cathedral, and the adjacent court buildings, with Jackson square, the open levee, the river, and the country on the right bank in front of them, and the handsome row of Pontalba buildings on each of the other sides of the square, which is beautifully adorned with evergreen shrubbery and flowering plants, with the fine equestrian statue of Andrew Jackson by Mills, and with well kept shell walks, is one of the most interesting afforded in New Orleans. There are many fine churches, some yet unfinished, one of which, a Catholic church in Common street, promises to be one of the most substantial and beautiful in the city. The Catholic church of St. John the Baptist, on Dryades street, between Calliope and Clio streets, which was opened in 1872, is a very elegant building. Another new place of worship worthy of note is the synagogue of Reformed Israelites, called the Temple Sinai, in Carondelet street. Parti-colored bricks and pointing give its walls a light airy appearance,

and it has a handsome portico, flanked by two towers capped with tinted cupolas. The Gothic windows are filled with beautifully stained glass. The old Gothic St. Louis cathedral, originally built by Don Andres Almonaster y Roxas, burned, and rebuilt in 1850, has often been described and represented. It has an imposing façade surmounted by a lofty steeple and flanked by two towers, each surmounted by a smaller steeple. Among the others worthy of note is the Jesuits' church of the Immaculate Conception with a college attached, in Baronne street, at the corner of Common; St. Patrick's church, in Camp street; the first Presbyterian church, in Lafayette square; St. Alphonsus Catholic church, in Constance street; and Trinity church (Episcopal), in Jackson street, which has lately been much improved and repaired. There are 33 cemeteries, about one sixth of which are within the inhabited limits of the city; three are Jewish, one is masonic, and one odd fellows'. A number are situated in Canal street, near Metairie ridge, and on this ridge adjacent. The old Metairie race course has lately been purchased and joined to them, and promises to become one of the most beautiful in the country. Those without the limits of the city are all more or less beautified with magnolia, cypress, willow, and other trees, and with a variety of flowering plants. The great peculiarity of these cemeteries is that, from the nature of the soil, which is almost semi-fluid at a depth of 2 or 3 ft., all the tombs are above ground. Some of these are very costly and beautiful structures of marble, iron &c.; but the great majority consist of cells, superimposed on each other, generally to the height of 7 or 8 ft. Each cell is only large enough to receive the coffin, and is hermetically bricked up at its narrow entrance as soon as the funeral rites have been performed. In most instances a marble tablet appropriately inscribed is placed over the brickwork by which the vault (or oven as it is called by many) is closed. It is a general custom to visit the cemeteries on All Saints' and All Souls' days (Nov. 1 and 2) every year, and to have the tombs decked with flowers, garlands, immortelles, and other tributes to the memory of the dead. Near the Battle monument, in St. Bernard parish, a national cemetery, wherein lie remains of deceased soldiers of the Union, has been established.—New Orleans has been known ever since its foundation to have suffered much from febrile diseases, and especially from yellow fever. Sauvolle, brother of Iberville and Bienville, founders of the city, died of *la fièvre*; and numbers of colonists and troops died of *les maladies de l'été* (summer diseases of febrile character). The distinction of these from yellow fever has been argued, but by no means proved. Apart from yellow fever, however, the healthfulness of New Orleans is not surpassed by that of any large city; and including all risks, the natives and thoroughly acclimated residents

compare favorably with those of any other community in respect of health or longevity. Yellow fever prevailed with some severity in 1799, and has repeatedly ravaged the city during the present century. Some of the most memorable epidemics were those of 1819, '22, '29, '33, '35, '37, '39, '41, '43, '47, '53, '58, and '67. Even in the most fatal seasons the natives and older residents have been to a great extent exempted, most of the mortality occurring among strangers and foreigners.—The population of New Orleans has increased with great rapidity. In 1769 it was 3,190; in 1785, 4,980; in 1788, 5,331; and in 1797, 8,056. According to the federal censuses it has been as follows: 1810, 17,243; 1820, 27,176; 1830, 46,310; 1840, 102,193; 1850, 116,375; 1860, 168,675; 1870, 191,418, of whom 50,456 were colored and 48,475 foreigners. In 1875 the number of inhabitants was estimated by local authorities at more than 210,000. Of the total inhabitants in 1870, 90,279 were males and 101,139 females; there were 25,941 males and 28,657 females between the ages of 5 and 18, and 47,737 males 21 years old and upward, of whom 38,586 were citizens. Of the foreigners, 17,361 were born in Great Britain (of whom 14,693 were natives of Ireland), 15,239 in Germany, 8,845 in France, 1,571 in Italy, 960 in Spain, 936 in Cuba, 668 in Switzerland, and 593 in the West Indies, exclusive of Cuba. There were 39,139 families and 33,656 dwellings. Of the total population, 28,063 attended school, of whom 945 were foreign born and 5,025 were colored. There were 28,109 persons 10 years old and upward who could not read, and 31,826 who could not write, of whom 5,450 were foreigners, 6,915 white, and 24,884 colored. Of 66,092 persons 10 years old and upward engaged in all occupations, 31,235 were employed in personal and professional pursuits, 17,404 in trade and transportation, 16,074 in manufactures, mechanical and mining industries, and 1,319 in agriculture. Since 1870 the births have averaged about 4,480 per annum, and the marriages about 1,860. The deaths in 1867 numbered 9,580; in 1868, 4,838; in 1869, 5,593; in 1870, 6,943; in 1871, 5,595; in 1872, 6,122; in 1873, 7,505; in 1874, 6,798.—There are three railroads connecting with northern, eastern, and western roads, running from New Orleans: the New Orleans, Jackson, and Great Northern, by Jackson and Canton, Miss., Grand Junction, Tenn., and Cairo, Ill.; the New Orleans and Mobile, by Les Petites Coquilles, a bridge over the Rigolets, the watering places on Lake Borgne, and Mississippi sound, Mobile, and roads running thence; and Morgan's Louisiana and Texas (formerly the Opelousas), crossing by ferry to Algiers, and running thence to Brashear, on the Atchafalaya. There are also a railroad to Donaldsonville, crossing the river by ferry and running up the left bank; and the Pontchartrain railroad, running to the lake and connecting by a boat with Madisonville,

Mandeville, Covington, and adjacent points on the lake. There are steamship lines running to Havana by Florida ports, to Baltimore *via* Havana and Key West, to Philadelphia *via* Havana, to Florida, to New York (several lines), to Boston, to Texas ports, to Vera Cruz, to Liverpool (several lines), to Havre, and to Bremen; and others, including one to Rio de Janeiro, are about being established. Including those of the railroads and that of the "Slaughter-house Company," seven ferry boats cross the river at short intervals to and from various points on the respective banks of the river. Among late improvements on the levee is a line of sugar sheds, affording protection to dealers in that staple. These, with 26 cotton presses, 20 cotton pickeries, 40 cotton brokers, 20 cotton buyers, and over 100 cotton factors, with their various employees and servitors, suggest the origin and ramifications of the chief industries of New Orleans. The customs district, of which New Orleans is the port of entry, embraces nearly the entire valley of the Mississippi, with ports of delivery at various points. The direct foreign commerce of a large extent of country accordingly is transacted through this port. In the value of its exports and of its entire foreign commerce it ranks next to New York, though several ports surpass it in the value of imports. The entire sugar and rice crops of the state are brought here for shipment, while the cotton crop of Louisiana, most of that of Mississippi, and much from Arkansas and Texas, are likewise brought here, making New Orleans the first cotton market in the country. The number of entrances in the foreign trade for the year ending June 30, 1874, was 840, of 630,940 tons; clearances, 855, of 658,513 tons; belonging to the port, 574 vessels, of 91,768 tons, of which 30, of 19,824 tons, were sea-going, and 150, of 37,201 tons, river steamers; entrances in the coastwise trade the previous year, 472, of 300,879 tons; clearances, 533, of 300,104 tons. The value of imports and exports from and to foreign countries for the eight years ending June 30, 1874, has been as follows:

YEARS.	Imports.	Exports.
1866-'67.....	\$11,142,249	\$85,426,851
1867-'68.....	11,386,858	60,175,896
1868-'69.....	11,414,898	75,590,224
1869-'70.....	14,993,754	108,147,847
1870-'71.....	19,427,288	95,246,791
1871-'72.....	18,542,188	90,802,849
1872-'73.....	19,933,344	104,598,732
1873-'74.....	14,583,864	98,715,710

The sugar product from 1870' shows an annual decrease in quantity and value, but more serious decrease has been felt at other periods. Between 1834 and 1861 the yield varied from 30,000,000 lbs., valued at \$2,700,000, in 1835, to 528,321,500 lbs., valued at \$25,095,271, in 1861; during the civil war it fell to 10,780,000 lbs., valued at \$1,994,300. The product and value for four years have been as follows:

1870, 168,878,592 lbs., \$14,260,636; 1871, 146,906,125 lbs., \$12,487,020; 1872, 125,346,493 lbs., \$10,027,717; 1873, 103,241,119 lbs., \$8,122,575. Similar fluctuations are noticed in the statistics of cotton from 1860 to 1874:

YEARS.	Receipts, bales.	Value.	YEARS.	Receipts, bales.	Value.
1860-'61.	1,849,312	\$92,465,600	1867-'68.	668,395	\$68,510,487
1861-'62.	88,800	1,769,040	1868-'69.	841,216	98,825,025
1862-'63.	22,078	5,107,082	1869-'70.	1,207,333	120,129,633
1863-'64.	131,044	46,677,872	1870-'71.	1,548,136	101,015,574
1864-'65.	271,015	73,820,398	1871-'72.	1,067,011	94,430,473
1865-'66.	787,386	140,312,185	1872-'73.	1,382,958	116,163,472
1866-'67.	780,490	97,629,299	1873-'74.	1,322,106	94,580,000

The rice crop shows on the whole a very large increase during the seven years from 1867 to 1874; the yearly product has been as follows:

YEARS.	Bbls.	YEARS.	Bbls.
1867-'68.	21,663	1871-'72.	29,973
1868-'69.	29,960	1872-'73.	52,206
1869-'70.	57,956	1873-'74.	96,546
1870-'71.	87,585		

In corn there has been an effort of late years to create a large foreign trade, which has met with fair success. The exports to transatlantic ports in 1873-'74 were, according to one authority, 1,034,348 bushels, against 695,925 in 1872-'73. The total value of the principal articles received from the interior from 1863-'74 to 1873-'74 is shown in the following table:

YEARS.	Value.	YEARS.	Value.
1863-'64.	\$79,233,948	1869-'70.	\$200,820,496
1864-'65.	113,549,285	1870-'71.	170,100,414
1865-'66.	201,722,179	1871-'72.	169,756,667
1866-'67.	168,343,569	1872-'73.	140,000,000
1867-'68.	127,459,561	1873-'74.	170,000,000
1868-'69.	167,559,658		

The receipts of leading articles for 1872-'73 and 1873-'74 were as follows:

ARTICLES.	1872-'73.	1873-'74.
Apples, bbls. and boxes.	113,984	74,293
Bacon, casks and hhds.	40,335	27,985
Bacon, boxes.	10,933	7,915
Bacon, hams, tcs.	20,401	18,578
Green meat, hhds.	11,748	8,349
Green meat, boxes.	3,551	3,076
Meats, lbs. in bulk.	1,459,208	2,378,974
Bagging, pieces.	7,409	8,960
Butter, firkins and kegs.	32,152	22,344
Bran, sacks.	191,830	117,373
Beef, bbls. and tcs.	6,769	9,374
Cotton seed, sacks.	839,738	908,993
Cheese, boxes.	52,330	38,231
Candles, boxes.	61,797	54,630
Coal, bushels.	5,841,264	4,943,406
Corn, bushels.	1,877,910	1,433,472
Corn, sacks.	1,384,127	1,316,236
Corn meal, bbls.	151,465	169,373
Flour, bbls.	1,046,124	1,001,504
Hides.	439,522	376,073
Hay, bales.	165,693	152,050
Lard, tcs.	50,257	31,683
Lard, kegs.	55,669	39,536
Lime, bbls. western.	49,905	44,935
Malt, sacks.	55,721	62,602
Molasses, bbls.	150,640	151,531
Molasses, half bbls.	5,340	5,262

ARTICLES.	1872-'73.	1873-'74.
Oats, sacks.	559,513	466,372
Onions, bbls.	26,260	15,081
Oils, cases.	16,788	12,636
Oils, bbls.	23,203	28,663
Oil cake, sacks.	98,528	70,479
Potatoes, bbls.	201,597	176,420
Pork, bbls.	101,324	76,427
Shingles, M.	6,255	11,474
Soap, boxes.	27,169	80,023
Staves, M.	3,967	4,234
Tallow, bbls. and tcs.	5,541	6,827
Tobacco, bbls.	30,182	16,738
Tobacco, pkgs., manufactured.	69,045	57,623
Whiskey, bbls.	51,219	33,163
Wheat, bushels, in bulk.	725	323,355

The following table gives the shipments of a number of commodities by sea and to Mobile and Texas, during the same period:

ARTICLES.	1872-'73.	1873-'74.
Bacon, casks and hhds.	18,029	10,655
Bacon, boxes.	3,625	8,443
Bran, sacks.	42,855	37,229
Coffee, sacks.	32,867	24,756
Corn, bushels.	833,411	1,001,630
Corn, sacks.	833,484	570,256
Corn meal, bbls.	25,226	23,182
Flour, bbls.	479,747	476,044
Hides.	568,521	358,708
Hay, bales.	22,342	15,075
Hams, tcs.	.....	5,351
Lard, tcs.	21,518	13,759
Lard, kegs.	16,698	9,528
Molasses, bbls.	103,252	93,218
Oats, sacks.	160,635	126,371
Oils, bbls.	37,060	36,063
Oil cake, sacks.	220,835	256,985
Pork, bbls.	15,692	8,762
Salt, sacks.	50,682	21,512
Staves.	.....	6,514,357
Sugar, hhds.	15,996	9,170
Sugar, bbls.	22,596	21,304
Tobacco, hhds.	19,959	25,947
Tobacco, pkgs., manufactured.	23,910	32,732
Whiskey, bbls.	33,559	27,069
Wool, sacks.	12,972	14,080
Wheat, bushels, in bulk.	None.	323,052

The manufactures of the city are not extensive. According to the census of 1870, the parish of Orleans contained 911 manufacturing establishments, employing 517 steam engines and 5,640 hands; capital invested, \$5,751,985; amount of wages paid during the year, \$2,554,554; value of materials used, \$4,566,543; of products, \$9,980,278. The principal manufacturing in 1875 were 5 of cotton-seed oil, 8 of sirup and cordial, 7 of tobacco, 3 of fertilizers, 3 of vinegar, 13 of soap, 5 sugar refineries, 5 distilleries, and 15 breweries. There were also 3 gas companies, 2 ice-manufacturing companies, 5 dry-dock companies or firms, 42 insurance companies, 23 banking institutions, 5 tow-boat companies, and 24 custom-house warehouses, arranged in four classes. —For municipal purposes the city is divided into seven districts, Algiers constituting the fifth, Carrollton the seventh, and the rest of the territory on the left bank the other five. It forms part of the first two congressional districts of the state, and for state legislative purposes is divided into 17 representative districts (in some cases with adjacent parishes)

and 6 senatorial districts. The government of the city is administered by a mayor and seven administrators (of finance, commerce, accounts, water works and public buildings, assessments, improvements, and police, respectively) elected by the people for two years. The salary of the mayor is \$7,000 a year, that of each of the administrators \$6,000. Two coroners are elected for the same period, one serving in the districts below Canal street, the other in those above it (Algiers, or the fifth district, being included in the upper), at a salary of \$5,000 and \$7,000 each, respectively. There is no city police proper, but a body called metropolitan police, which is virtually a state militia police or state police militia, under the command of the governor, includes in its duties those of policing the city. Its organization is controlled by a board of police commissioners, five in number, appointed by the governor, and having for its president *ex officio* the lieutenant governor, and the city administrator of police as a member *ex officio*. The board appoints a superintendent, who ordinarily commands the force. A portion of the body is regularly mounted on suburban duty, and another portion is devoted to harbor duty. The annual expenditure for the body is about \$260,000. A fire alarm and police telegraph is under the control of the police board. All police expenses are paid by a city tax. There are ten police stations in which persons arrested are confined until examination. There are five municipal, police, or recorders' courts, in which minor offences are disposed of, and others sent before higher courts. Of the least grave of these the first district court has cognizance; the superior criminal court of the more heinous ones. Minor offenders are confined in the workhouse, others in the parish prison, and convicted felons are sent to the state penitentiary in Baton Rouge. Capital punishments are carried out in the parish prison. The recorders are appointed by the governor, are paid by the city \$2,500 per annum each, and have to remit to the city all fines levied. The judges of the district courts receive a salary from the state each of \$5,000 per annum, except the judge of the superior district court, who is paid \$7,500. The civil administration of justice in cases involving less than \$100 is effected through eight courts held by justices of the peace, two in the first district and one in each of the other districts of the city. For amounts above \$100 there are six district courts, all sitting in the same building, adjacent to the St. Louis cathedral. The judges and clerks of these courts are elected by the people for four years. The state supreme court sits in New Orleans from November to May, in a building contiguous to the St. Louis cathedral. The United States district and circuit courts sit in the custom house. The fire department is an extensive and influential organization. The city contracts with it for the extinction of all fires, which costs about \$160,000 a year. This is all

devoted to the general expenses of the association, the support of widows and orphans, the purchase of engines, horses, hose, carriages, and other apparatus, and the erection and repair of engine houses, &c. The members of the association, with the exception of the engineers, housekeepers, and hostlers, give their services voluntarily. There are 18 engine companies, all of whom have fine steam engines, besides four hook and ladder companies. Fire alarms, for which there are more than 100 stations, indicate the precise locality of the station from which they are sent. The fire departments in Jefferson, Algiers, and Carrollton are separate organizations, and have nine engines, several of which are hand machines.—The water of the Mississippi was introduced into the city for domestic uses in 1836. In 1868 the city assumed its reserved right of purchasing the works, paying for them \$1,300,000 in city bonds. They are situated a mile and a half above Canal street, about 200 yards from the river. About 11,000 hydrants and 12,000 fire plugs are attached to them; but many of the former are cut off from supply in consequence of inability or unwillingness to pay the rates charged for water by the city. These are \$12 per annum for each family of four, and \$1 additional for each additional inmate. Most of the dwellings are also provided with large cisterns for rain water. According to the census of 1870, the assessed value of real and personal estate (which in 1860, before the recent additions to the city's jurisdiction, was computed at \$125,284,305) was \$146,718,888; its true value, \$185,625,187. The total taxation not national was \$4,191,417, of which \$3,050,000 was imposed by the parish, and \$1,141,417 by the state. The public debt of the city was stated to be \$26,500,000. The state assessment rolls for 1874 show a taxation of \$1,986,082 52.—Near Jackson square are the several buildings constituting the French market. Their extent and antique appearance, the abundance and varied character of their supplies, the number of various races seen, and the Babel of languages heard there, have given this market a world-wide fame, which it still deserves. There are 20 other markets, several of which are noteworthy for their neatness, substantiality, and commodiousness. They are farmed out by the year to the highest bidders, who reimburse themselves by the rents of stalls. For 1875 they yielded to the city about \$260,000. Besides these public markets there were three wholesale and about 80 private ones, the latter of which a late act of the legislature prohibited. The former transact their business at the abattoir, constructed by a corporate company styled "The Crescent City Live Stock Landing and Slaughter-house Company," on a property 240 acres in extent. It is situated on the left river bank adjacent to the lower line of the city. The establishment comprises two cattle-landing wharves; 12 covered cattle pens, each having

an area of over 1,000 sq. ft.; 28 open pens, each with an area of about 1,125 sq. ft.; 18 other pens for sheep, hogs, &c.; two receiving pens, each of an area of 600 sq. ft., for cattle immediately to be slaughtered; a slaughter house for cattle in 22 divisions, each of an area of 800 sq. ft.; a slaughter house for smaller animals well supplied with hot as well as cold water, and covering an area of 21,200 sq. ft.; and 22 stables. These buildings are separated from each other by wide and well constructed causeways, and are lofty and airy. Attached to them are two steam engines by which a plentiful supply of water is commanded and the fluid offal is pumped off, covered hide vats, an apparatus for the rapid curing of hides, and a Barbarin patent gas apparatus for lighting the whole establishment. Several dwellings and other buildings are also comprised within the property of the slaughter-house company. The average number of cattle slaughtered is about 1,000 a day in winter and about 700 in summer. The slaughtering of any of these animals elsewhere within the city limits is prohibited by law. An inspector, appointed by the governor, examines all cattle killed and certifies to their fitness for food.—The Howard association is one of the most prominent charitable bodies in the world, in view of the wide extent of its operations, the immense amounts it has disbursed, and the vast number of patients it has succored. Its special mission has been to labor for the relief of sufferers in epidemics, particularly of yellow fever and cholera. In these cases its operations have extended to every city and district in the south which has been afflicted. In seasons of epidemic infliction it has been the depository of contributions from all parts of the country as well as from the citizens of New Orleans. The hospitals, infirmaries, and asylums in the city are some 55 in number. Prominent among them are the Hôtel-Dieu and Charity, Luzenberg, and smallpox hospitals; the Orleans, Touro, and Circus street infirmaries; the Jewish widows' and orphans' home; and the John McDonogh asylum. The Charity hospital, founded by Don Andres Almonaster y Roxas in 1784, is widely known. It has stood on its present site, in Common street, since 1832, affording a refuge to an average of 500 or 600 patients in ordinary seasons, and to nearly or quite double the number in others. Its domestic management is in the hands of the sisters of charity. It depends almost or entirely upon state appropriations, and hitherto has been well supported. The Hôtel-Dieu, half a mile further back from the river, is a very fine hospital established by the sisters of charity, and supported entirely by receipts from patients, some of whom are nevertheless beneficiary. It occupies a full square, and is surrounded by a well kept garden of shrubbery and flowers. Other prominent institutions are the Poydras female orphan asylum, in Magazine street, in the sixth district, the St. Anna's

widows' asylum, the St. Vincent's orphan asylums, the indigent colored orphan asylum, the convent de la Sainte Famille for colored widows, and the German Protestant asylum. The Touro almshouse, founded by Judah Touro, was burned during the civil war by colored troops who had occupied it. Unsuccessful efforts have been made to induce congress to grant an appropriation for the restoration of the buildings. Besides the relief afforded through the various channels already noticed, much more is derived from the freemasons, odd fellows, and numerous similar societies.—To almost all the churches Sunday schools are attached, and a large proportion of them have also regular day schools connected with them. The Catholic church schools are very largely attended, the charges being very low, and in many cases entirely remitted. The public schools in the city are under state control, although the city is called upon to pay the taxes by which they are supported, amounting at present to \$360,000 a year. The state board of education, consisting of the state superintendent and six division superintendents, appointed by the governor on the state superintendent's recommendation, elect 18 directors for the city, who choose the assistant superintendent, secretary, assistant secretary, teachers, porters, &c. There are nearly 80 schools, including one boys' high school and two girls' high schools. The other schools are of five grades. There are employed on the average 425 teachers, of whom about nine tenths are females. The salaries vary from \$2,400 a year for the principal and \$1,500 for associates in the boys' high school, to an average of \$766 for teachers in the lowest grade. Teachers in the first grade of grammar schools get \$1,500. There are very few private schools of any importance except those attached to religious bodies, and the great majority of others are for young ladies. The Peabody normal institute is supported from a fund bequeathed for such purposes by George Peabody. The Straight university, founded by Mr. Seymour Straight, is exclusively for colored students. It has a corps of six teachers and an average attendance of 100 students. Its instruction is of good grammar school grade. There are separate schools, both public and private, for colored pupils; and a few colored pupils have been admitted into some of the public schools which are nominally exclusively attended by white pupils. Yet the general opposition to "mixed schools" is very deep-seated and resolute in the minds of the white population. The "Agricultural and Mechanical College," founded under a congressional grant of scrip for over 200,000 acres of land, opened in May, 1874, is a thoroughly "mixed school." As yet nothing has been taught in practical agriculture or mechanics. It has been established in one of the university buildings in the city, and has a professor of mathematics, a professor of chemistry, a tutor in mechanical drawing, and a tutor in modern languages and

history. The board of control have taken steps for a permanent location of the college at Chalmette, St. Bernard parish, on land belonging to the state, to be added to by the purchase of adjacent property on which there are suitable buildings. They report in January, 1875, actual assets to the amount of \$240,300 77, and further contingent assets to the amount of \$170,800, making a total of \$411,100 77. The state university comprises only two departments, law and medicine, but both of these are of very high order, and are very largely patronized, especially the medical department, which during the past several years has had an annual average of nearly 200 students and of about 65 graduates. The state constitution requires a literary department to be connected with the university, but the legislature has hitherto neglected to provide for it. Children are sent to Virginia, to the north, or to Europe for a higher education. A dental college exists, but has not many students. There are four commercial colleges. There is an academy of sciences, founded in 1853, but it has suffered from lack of encouragement and support. To some of the educational establishments there are libraries attached, as to the Straight university and the boys' high school; but these are very limited in extent and character. There is a library belonging to the city and another to the state, which are still respectable, but very far from what they have been. The state library was removed and greatly damaged by neglect and pilfering during the war. Some of the clubs of the city have small libraries. There are a few good private libraries, but they have shared the common fate.—There are about 20 clubs in the city, prominent among which are the Boston, the Pickwick, the Shakespeare, and the Jockey clubs. The Jockey club has a beautiful house and highly decorated and cultivated grounds, on property purchased from the fair grounds. The Shakespeare club gives occasional dramatic performances which are always largely and fashionably attended. The existing theatres properly so called are the St. Charles, the Varieties, the academy of music, the opera house, and the National or Globe. Of these, the St. Charles and the academy are the only two which have been able to continue in operation with success during the late unprosperous times. Besides the theatres there are a score or more of halls in which entertainments of various kinds are given. The principal of these are the masonic hall in St. Charles street, odd fellows' hall and St. Patrick's hall in Camp street, opposite Lafayette square, exposition hall in St. Charles street, and Grünewald hall in Baronne street, between Canal street and the university buildings. The lyceum hall in the city hall, which was built for such purposes, has been transformed into public offices. Among the societies which have been formed for the purpose of festival celebrations are that known as the "King of

the Carnival" or "Rex," in which an effort was made to merge all others, the "Mistick Krewe of Comus," the "Twelfth Night Revelers," and the "Knights of Momus." From Christmas to Lent these various associations give entertainments and processions through the streets, with a gaiety and universal enjoyment unequalled elsewhere in the United States, and culminating in a display of profusion and *abandon* on Mardi gras or Shrove Tuesday which have made them widely famous.—There are in New Orleans 7 daily (1 French and 1 German), 1 semi-weekly, and 12 weekly newspapers, besides a monthly and a bi-monthly periodical. The number of churches is 142, viz.: Baptist, 22; Congregational, 8; Episcopal, 12; Evangelical Protestant, 5; Jewish, 6; Lutheran, 4; Methodist Episcopal, 22; Methodist Episcopal, South, 11; Presbyterian, 12; Roman Catholic, 38; Swedenborgian, 1; Unitarian, 1.—The site of New Orleans was surveyed in 1717 by De la Tour; it was settled on in 1718, but abandoned in consequence of overflows, storms, and sickness; resettled in 1723, held by the French till 1769, then by the Spanish till 1801, and by the French again till 1803, when, with the state, it was ceded to the United States. It was incorporated in 1804, and in 1836 it was divided into three municipalities, each with a separate government; but in 1852 these municipalities were consolidated, and the limits of the corporation were extended to include the town of Lafayette, lying in the adjacent parish of Jefferson. In 1870 (before the census) Algiers was included within the city limits, and by the same act the corporation was extended over the entire parish of Orleans on the left bank, except Les Petites Coquilles, which are said to have been omitted through a misapprehension in regard to the legal boundaries of the parish. The city of Jefferson, Jefferson parish, was also annexed by this act, and in 1874 Carrollton was added from the same parish. New Orleans was made the capital of the state by the constitution of 1868. The most memorable event in the history of New Orleans, from its transfer to the United States to the breaking out of the civil war, was the battle on Jan. 8, 1815, for an account of which see JACKSON, ANDREW. The battle was fought on the plains of Chalmette in the parish of St. Bernard, 4 m. from the city, where stands an unfinished marble monument.—New Orleans, being the largest city of the south, its principal shipping port, and the commercial entrepot of the valley of the Mississippi, was of great importance during the first two years of the civil war. Its population mainly sympathized with the movement for secession, and directly after the passage of the South Carolina ordinance the city came practically into the hands of the state authorities, who took possession of the forts below, which commanded the passage of the Mississippi, and on Feb. 1, 1861, seized the United States mint and custom house; and soon after

the city was occupied by a considerable confederate force. Plans for its recapture were at once formed by the federal government; but the first definite action took place in February, 1862, when a combined naval and military force, under Commodore Farragut and Gen. Butler, was sent thither. The main obstacle to its advance was Forts Jackson and St. Philip, on opposite banks of the Mississippi, about 83 m. below New Orleans. They were supposed to be very strong, and there was a considerable fleet stationed above them; but on April 24 Farragut succeeded in passing the forts and destroying the vessels above. Passing up the river, he met little opposition, and reached New Orleans, which was entirely commanded by his fleet. He then demanded the formal surrender of the city. The confederate military force had been withdrawn, and the civil officers declared that they had no authority to make a formal surrender; but it was agreed that Farragut should take peaceful possession. In the mean while the forts below, which Farragut had merely passed, were given up, and on May 1 Butler took formal possession of New Orleans as military governor. He ruled the city with great vigor until Dec. 14, when he was superseded by Gen. Banks. Since the close of the war the city has been the scene of several disturbances, growing mainly out of the conflicting pretensions of the two parties claiming to be the legal authorities of the state of Louisiana.

NEW PHILIPPINES. See CAROLINE ISLANDS.

NEWPORT, a S. E. county of Rhode Island, consisting of a small portion of the mainland

and several islands, including Rhode, Canonicut, and Prudence islands in Narragansett bay, and Block island, S. W. of it; area, 136 sq. m.; pop. in 1870, 20,050. It has an undulating surface and a generally fertile soil, and contains large quantities of coal. The Old Colony railroad terminates in Newport. The chief productions in 1870 were 92,975 bushels of Indian corn, 76,980 of oats, 16,661 of barley, 92,878 of potatoes, 39,044 lbs. of wool, 266,775 of butter, and 17,229 tons of hay. There were 1,426 horses, 3,659 milch cows, 1,620 working oxen, 2,007 other cattle, 19,930 sheep, and 2,615 swine. The total number of manufacturing establishments was 184, with a capital of \$993,350, and annual products amounting to \$2,346,232. The most important were 1 copper-smelting establishment, 2 manufactories of cotton goods, 3 of furniture, 1 of cotton and woollen machinery, 6 of brick and stone, 10 of fish oil, 5 of tin, copper, and sheet-iron ware, 3 of upholstery, 14 flour mills, and 13 ship yards. Capital, Newport.

NEWPORT, one of the capitals of the state of Rhode Island, on the W. shore of Rhode island, and on Narragansett bay, 5 m. from the ocean, and 22 m. S. S. E. of Providence, in lat. 41° 29' N., lon. 71° 19' 12" W.; pop. in 1870, 12,521. It is a port of entry, and has a fine harbor, which may be entered at all times without a pilot, and is safe, commodious, and deep enough for the largest ships. It is defended by Fort Adams on Brenton's point. The city is on a declivity facing the harbor, and contains a state house, custom house, city hall, the Redwood library with 20,000 vol-

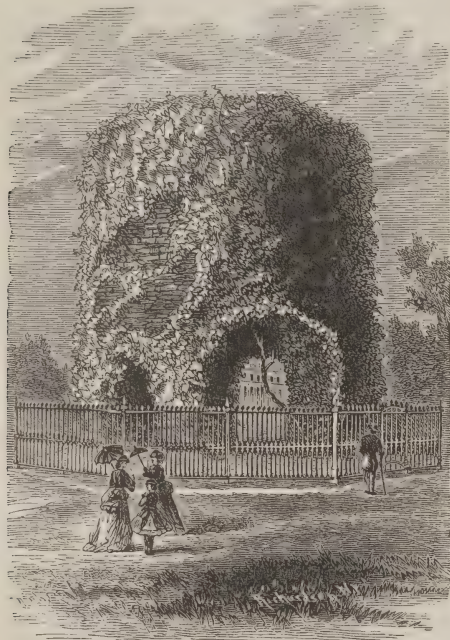


Newport.

umes, the People's library (free) with 15,000 volumes, the masonic hall, armory hall, and numerous elegant private residences. Its salubrious climate, refreshing ocean breezes, facilities for sea bathing, and charming natural scenery have rendered it one of the most

popular summer resorts in the United States, and the visitors during the fashionable season are numbered by thousands. The whole S. portion of the island is now dotted over with villas, and there are several large hotels. The older part of the city is interesting for its quaint

and picturesque appearance. The "old stone mill," whose origin and purpose were once a theme of much learned discussion, and which is still asserted by some antiquaries to have been built by the Northmen 500 years before the arrival of Columbus; the ruined Fort



Old Mill, Newport.

Louis, at the entrance of the harbor, and its surrounding rocks, called "the Dumpings;" Fort Adams, one of the most costly and extensive fortifications in the Union; the "Purgatory Rocks" and "Hanging Rocks;" the "Spouting Cave," and "the Glen," are the principal objects of interest. The beaches are excellent for bathing, and for promenades at low tide. Bellevue avenue, 2 m. long, and lined with villas, is at fashionable hours crowded with elegant equipages; and a fine drive, called the "Ocean drive," has lately been laid out along the southern shore of the island. A favorite resort is Touro park, given to the town by Judah Touro, who was born here. The Jewish cemetery and synagogue are still carefully preserved through bequests left by him, although there are now no Jews to use them. The commerce of Newport is now very limited, and its manufactures are almost confined to a few cotton mills, a brass foundry, and lead works. The value of imports for the year ending June 30, 1874, was \$11,135; of exports, \$19,544; vessels belonging in the district on that date, 135, tonnage 8,660. The city is connected with Boston by the Old Colony railroad, and daily steamers from New York to Fall River, Mass., touch here.—Newport was

settled in 1638 by 17 colonists from Roger Williams's party, headed by William Coddington. The settlers were early distinguished for their enterprise as merchants and navigators, and for their activity in the whaling business. As early as 1764 their trade with the West Indies employed 150 vessels, and 14,000 hhd. of molasses were annually imported, to be converted into rum for the African market. Some years before the Boston tea party the British armed sloop *Liberty*, stationed here to exact an odious tax, was burned in the harbor. During the revolution 8,000 British and Hessian troops were quartered on the town, and its commercial interests have never recovered from the injury which they inflicted. They destroyed 480 houses, robbed the library, then the finest except one in America, burned the shipping, cut down all the groves and orchards for fuel, and carried off the town records. Before this period Newport had been a favorite resort of men of science and letters, and was noted for the opulence and refinement of its inhabitants. Bishop (then Dean) Berkeley resided here 2½ years, and built a house which is still standing in the adjacent town of Middletown. It was here that he composed his celebrated work, the "Minute Philosopher." Commodore O. H. Perry was born near Newport, and is buried there, with a monument to his memory. A bronze statue of his brother, Commodore M. C. Perry, a native of Newport, has lately been placed in Touro park. It is by J. Q. A. Ward, and has bass reliefs on the pedestal, representing Commodore Perry's exploits in Mexico, Japan, and elsewhere.

NEWPORT, a city of Campbell co., Kentucky, on the Ohio river, immediately above the mouth of the Licking, and opposite Cincinnati, 63 m. N. N. E. of Frankfort; pop. in 1850, 5,895; in 1860, 10,046; in 1870, 15,087. It is handsomely built on an elevated plain commanding a fine view, and is ornamented and made attractive by numerous shade trees. In the city and its suburbs are a large number of elegant residences. Communication with Cincinnati is maintained by a steam ferry and a splendid new iron bridge for ordinary travel and railroad trains. There is a suspension bridge over Licking river between Newport and Covington, and a street railroad running over this bridge and the Covington and Cincinnati bridge connects the three cities. A street railroad also connects Newport with the two villages of Dayton and Bellview, situated on the Ohio river above the town. The Louisville, Cincinnati, and Lexington railroad passes through the city. It is noted for its excellent schools. There are several large rolling mills, iron foundries, saw mills, and various manufactures. The city contains a bank, a United States arsenal and military post, a daily and weekly newspaper, and ten churches. The principal courts of the county are held here.

NEWPORT. I. A municipal and parliamentary borough and market town of Monmouth-

shire, England, on the right bank of the river Usk, about 5 m. from its mouth, and 20 m. S. W. of Monmouth; pop. in 1871, 27,069. It is largely engaged in ship building, and has several iron foundries, nail works, and manufacturing of anchors, chain cables, &c. There is a dock capable of admitting large vessels. In 1872 there entered the port 2,573 British vessels, tonnage 279,159, and 363 foreign vessels, tonnage 91,429; cleared, 8,110 British vessels, tonnage 718,063, and 566 foreign vessels, tonnage 179,868. The imports of foreign and colonial merchandise were valued at £362,245, the exports at £2,233,770; the gross amount of customs duties was £51,374. The town is connected with Gloucester and Cardiff by railway, and with Pontypool by railway and the Monmouthshire canal. Of the castle of Newport, which is supposed to have been built by the earl of Gloucester, a son of Henry I., only a square tower and a part of the great hall remain. In 1839 it was the scene of the chartist insurrection for which John Frost and others were found guilty of high treason and transported for life. **II.** A municipal and parliamentary borough of Hampshire, England, in the isle of Wight, on the left bank of the river Medina, which is navigable for small vessels, 18 m. S. S. E. of Southampton; pop. in 1871, 8,522. Lace and agricultural implements are manufactured.

NEWPORT, Christopher, one of the founders of the colony at Jamestown, Va. He commanded the three vessels which carried out in 1606 the first settlers of that colony, and was one of the council appointed by the king for governing the province. After visiting Powhatan with Capt. John Smith and others, he returned to England in June, 1607. He came back the next year with supplies and 120 emigrants, chiefly goldsmiths and gentlemen, "packed hither," says Smith, "by their friends to escape ill destinies." As their object was gold, "there was no talk, no hope, no work, but dig gold, wash gold, refine gold, load gold;" and some yellow mica having been discovered near the present site of Richmond, Newport filled his vessels with it under the impression that it was gold, and carried it to England. He subsequently returned to Virginia in the fleet conveying Lord Delaware and the new charter to the colony, but was wrecked in the Bermudas, where they built a vessel with which they reached their destination. Newport's "Discoveries in America" was first published in vol. iv. of *Archæologia Americana*, in 1860.

NEW PROVIDENCE, one of the Bahama islands, near the centre of the group, and containing Nassau, the seat of government; pop. about 9,000. It is 17 m. long from E. to W., and 7 m. broad. It was colonized by the English in 1629, and twice taken from them by the Spaniards, but finally restored at the peace of 1783. It is more hilly than most of the other islands of the group, has some fertile land, and produces good fruits.

NEW ROSS, a parliamentary borough of Ireland, partly in Wexford and partly in Kilkenny county, on the Barrow, 2 m. below its junction with the Nore, 73 m. S. S. W. of Dublin; pop. in 1871, 6,738. The river, which admits vessels of 600 tons to discharge at the quay at all times of the tide, and those of 800 at high springs, is crossed by an iron bridge, with a draw. The town has a fever hospital, dispensary and lying-in hospital, union workhouse, and barracks. Above and below the town is an important salmon fishery, in which more than 800 men are employed.

NEWRY, a parliamentary borough and river port of Ireland, on the borders of the counties of Down and Armagh, on the Newry water and canal and the Dublin and Belfast junction railway, 34 m. S. W. of Belfast, and 57 m. N. of Dublin; pop. in 1871, 14,181. There are two Roman Catholic churches, one of which is the cathedral of St. Patrick, Dromore, two convents, and several Protestant churches. The chief manufactures are linen, cotton, iron, beer, and cordage; and there are numerous mills, distilleries, and potteries. Extensive water works have recently been erected. The town exports large quantities of butter, grain, and cattle. Its principal trade is with Liverpool and Glasgow, but it has also some foreign commerce. The river, which is here crossed by four stone bridges, admits vessels of 600 tons to the town and of 1,000 tons 6 m. below. The imports in 1872 were valued at £368,835, and the exports at £20,180.

NEW SOUTH WALES, a British colony occupying the S. E. part of Australia, stretching along the S. Pacific ocean from Cape Howe to Point Danger, bounded N. by the colony of Queensland, E. by the Pacific, S. by the colony of Victoria, and W. by the interior territory of the colony of South Australia. It extends between lat. 28° and 37° 30' S., and lon. 141° and 154° E. Its greatest length, E. and W., is about 780 m.; greatest breadth, N. and S., 620 m. The area, according to an official statement, is 323,437 sq. m.; according to a planimetric calculation, believed to be more correct, 308,560. The population according to the census of April 2, 1871, was 503,981; on Jan. 1, 1873, it was officially computed at 539,190. The colony of Queensland, extending from lat. 26° to 30° S., was formerly the Moreton Bay district of New South Wales, and was separated from the latter colony in June, 1859. In 1873 New South Wales was divided into 118 counties, of which 20, which have been settled a long time, are called the old counties; the others, called the new counties, are principally in the interior.—The coast line presents in general bold perpendicular cliffs of sandstone, occasionally interrupted by low sandy beaches, some of which stretch a considerable distance inland, and appear to have been covered by the sea at no very remote period. There are numerous indentations along the shore, some of which form excellent harbors. The most

important are Port Stephens, Port Hunter, Port Jackson, Botany bay, Jervis bay, and Twofold bay.—The principal ranges of mountains are the interior ranges, the great dividing chain, and the coast ranges. The former lie near the western boundary of the colony, and form the western watershed of the Darling river; the loftiest elevation is Arrowsmith, 2,000 ft. The great dividing chain extends throughout the whole length of the E. and S. E. coasts of Australia, and forms the main watershed of the country. It consists of seven main branches, viz.: the New England range, highest point Ben Lomond, 5,000 ft.; the Liverpool range, highest point Oxley's peak, 4,500 ft.; the Blue mountain, Cullarin, Gourock, and Maneroo ranges; and the Muniong range, highest point Kosciusko, 7,176 ft. All this series is connected with the Cordillera, dividing the E. and W. watersheds. The coast ranges lie E. of the great dividing chain, and parallel to it for a considerable distance. They generally form the edge of the elevated table land upon which lies the great dividing chain. The loftiest peak is Mount Seaview, 6,000 ft. The space between the mountains and the sea has an undulating wooded surface, broken by spurs from the mountain range, and in some places covered with dense brushwood. The ground to the west continues rugged and mountainous for a considerable width, and at last assumes the form of an elevated plateau, a great part of which remains unexplored. Several considerable rivers rise on the W. side of the mountains, but have only the first part of their course in New South Wales. The more important are the Murray, Murrumbidgee, Lachlan, Darling, Bogan, and Macquarie. The rivers E. of the mountain range are mostly small, and many of them are dry during part of the year. The chief are the Hawkesbury, Hunter, Macleay, Shoalhaven, Clarence, and Richmond.—The prevailing rock on the E. side of the mountains is sandstone, and on the W. granite. Much of the sandstone belongs to the carboniferous system, and there are several workable seams of good coal. The Newcastle field on the Hunter river is excellent, and contains five seams, two of 5 ft. and three of 3 ft. in thickness. This field is worked extensively, and the produce, after supplying colonial demands, is shipped to India, China, and California to supply steamers. Several other fields are known, and one is worked at Wollongong. Iron ore is found in many places, and some of it is worked. Rich copper ore is abundant in and around Wellington district. Fine pebbles are so plentiful in the Hunter river that it is supposed in some part of its course to flow over rocks of jasper, agate, opal, and chalcedony. But all these were regarded as comparatively unimportant after the discovery of rich deposits of gold in May, 1851. Gold has since been found in numerous places throughout the colony, and in the territories both N. and S. of

it. Near the frontiers of Victoria, particularly in the counties of Wellesley and Wallace, it occurs in several localities; and N. of these it is met with in several other counties, and is found on the banks of the Macquarie river. There are considerable deposits about the Peel and its tributaries, and also on the Fitzroy river somewhat beyond the N. frontier. Australia being in the southern hemisphere, the seasons are the reverse of ours; December is there midsummer, and June midwinter. Summer extends over December, January, and February; and the mean heat during these three months is about 80° at noon, tempered by the sea breeze, which begins to blow regularly along the coast about 9 in the morning, and continues till evening. The whole colony is subject to hot winds, which are liable to happen three or four times during the summer, and which blow from the northwest, raising the thermometer to 125° when exposed to their influence. These winds seldom last longer than a few hours, and are succeeded by a very heavy squall from the south, generally accompanied by thunder and rain, cooling the atmosphere immediately. At Sydney the average annual temperature is 64°; that of spring being 65°, of summer 72°, of autumn 66°, and of winter 55°, showing an annual average range of the thermometer of 17°. The temperature of the country above the mountains is much lower, and at some places snow falls in winter. The annual fall of rain is 52 inches at Port Jackson, and 62 at Port Macquarie. Droughts are frequent, but the climate is both healthful and agreeable, and its influence is highly beneficial in consumptive diseases.—For 5 or 6 m. from the seacoast the country is in general barren, the soil being mostly composed of drift sand covered with a stunted vegetation. Some rich and fertile districts occur at intervals. Further inland well wooded and fertile valleys lie between the hills, but the land on the E. side of the Blue mountains is as a general rule much inferior both for agriculture and pasture to that on the W. Above the range it consists of a dry black soil, covered with open forests and luxuriant herbage. Wheat, barley, oats, rye, grasses, maize, tobacco, and small quantities of cotton, are all profitably cultivated in different parts of the colony; and potatoes, cabbage, carrots, parsnips, turnips, peas, beans, cauliflowers, lettuces, cucumbers, pumpkins, sweet potatoes, yams, and plantains thrive remarkably well. At Sydney the market is supplied with green peas all the year round; very few vegetables degenerate, and many are more productive than elsewhere. Peaches, apricots, nectarines, loquats, oranges, pears, plums, figs, pomegranates, raspberries, strawberries, mulberries, and melons attain great perfection. The N. districts produce pineapples, bananas, guavas, lemons, citrons, and various other tropical fruits, while W. and S. of Sydney the apple, currant, gooseberry, and cherry are found to grow well. In 1871, 4,152 acres were planted with the vine,

and the grapes are of the finest quality. The total number of acres under cultivation was 417,801. There were 304,100 horses, 2,014,888 horned cattle, 16,278,697 sheep, and 213,193 swine. The climate is particularly well suited to all these animals. Horses are exported in large numbers to India; horned cattle grow to an immense size; and the wool of the sheep is very superior. Asses, mules, and goats are seldom seen. The camel has been introduced for exploring purposes, but has not thriven. Llamas, alpacas, and vicuñas have been introduced. Domestic fowl of every description thrive remarkably well, and are reared at small expense. Fish are abundant on the coasts; and there is a kind of fresh-water codfish in the Murray river which weighs sometimes as much as 70 lbs. Oysters are plentiful, and turtles are procured from the N. part of the colony. Much of the soil of New South Wales is very fertile. Within a few years the improved agricultural machines have been introduced, but the attention of the colonists is still devoted chiefly to the produce of the pasture lands, wool, hides, and tallow. In 1871 the amount of wool exported was 48,700,000 lbs., valued at £4,700,000. Very superior wines are made, resembling Sauterne, Barsac, hock, and claret. In 1873 more than 200 wine presses were in operation. The chief manufactures are leather and a kind of woollen cloth called "colonial tweed," which is exceedingly durable and in high favor among the settlers. Sugar refining is carried on to a considerable extent at Sydney; and there are extensive distilleries, breweries, various sorts of mills, foundries, tallow-boiling establishments, and docks, in different places throughout the colony. The total number of manufactories of all kinds in 1872 was 6,242. The imports in that year were valued at £9,208,496, of which £3,569,559 were from the United Kingdom and the British colonies; the exports at £10,447,000, of which £3,710,000 were to the United Kingdom and British colonies, including wool to the value of £2,782,000. The exports included also gums, bark, copper ore, and timber. In 1871, 1,891 vessels of 706,019 tons entered the ports, and 2,123 of 794,460 tons cleared. Four fifths of all were under the British flag. Gold in its natural state is subject to a duty of 2s. 6d. an ounce on leaving the colony, and so appears in the custom-house returns; but the coined gold, having already paid this tax in the shape of mint charges, is allowed to pass free. Some of the imports from the neighboring colonies, the whole produce of the whale fisheries, and the greater part of what is received from the South sea, are merely transhipped in the ports of New South Wales while *in transitu* to other parts of the world. The first railway was projected in 1846, to connect Sydney with Melbourne. In 1872 the aggregate length of railways in the colony was 405 m. There are 570 post offices. Sydney is the capital; the other principal towns are East and West Maitland,

Liverpool, Bathurst, Goulburn, Windsor, Newcastle, Yass, Penrith, and Paramatta. There is a university at Sydney, with two affiliated colleges; and in 1871 the colony had 1,450 schools, with 2,089 teachers and 77,889 pupils. There is a branch of the London mint, which issues gold coin, current in all the neighboring colonies and in Mauritius, Ceylon, and Hong Kong. The public press includes three daily newspapers and several other periodicals published at Sydney, and newspapers at Maitland, Bathurst, Goulburn, and other places.—The government of New South Wales consists of a governor appointed by the crown, an executive council chosen by the governor, and two houses of legislature, one nominated by the governor and called the legislative council, and the other elected by the people and called the legislative assembly. No allowance is paid to any of these members, except to those of the ministry or executive council, which is composed of the colonial secretary, the treasurer, the postmaster general, the solicitor general, the attorney general, and the minister of lands and public works. These ministers are all required to possess seats in the house of assembly, and retain their offices only so long as they can secure a majority in this branch of the legislature. The qualifications required for a voter are that he should be a householder, or if living in lodgings that he shall be earning wages at the rate of £100 a year, and that he should have resided six months in the colony. All voters are eligible to membership. The house of assembly, composed of 72 members, makes laws within the colony not repugnant to those of Great Britain; it regulates the revenue, and makes all appropriations for the public service. Measures passed by it do not become law till they have been approved by the legislative council and the governor, who has power to dissolve the house at pleasure. The revenue is derived from import duties and miscellaneous taxes, and from the proceeds of the sale of public lands and licenses to depasture. In 1872 it amounted to £2,794,274, and the expenditures to £2,362,482. For 1874 the revenue was officially estimated at £3,168,935. The public debt on Sept. 30, 1873, amounted to £10,829,885.—According to the census of 1856, barely a third of the population of New South Wales was born in Australia; about 75,000 were supplied by England and Wales, 50,000 by Ireland, 16,000 by Scotland, 5,000 by Germany, and 2,000 by China. The population now (1874) includes a large admixture of Chinese, many Americans, and some of almost all European nationalities. From 1866 to 1872 the total number of immigrants exceeded 150,000, while about 100,000 emigrated. The emigration included 4,917 Chinese, while the number of Chinese immigrants was only 1,520. The number of births in each of the seven years from 1866 to 1872 was more than double that of the deaths, and in 1870 and 1871 it was three times as large. In appearance and character the na-

tive-born part of the community bear a strong resemblance to those of Anglo-Saxon descent in the United States. Since the establishment of the colony in 1787-'8, the total number of convicts sent into it from Great Britain up to 1840, when the importation ceased, was 54,383. Many whose progenitors came to New South Wales as prisoners are intelligent and estimable members of the community. Some of the emancipists, and several of their descendants, are among the wealthiest people in the colony. The religious division of the inhabitants in 1871 was as follows: Church of England, 229,243; Presbyterians, 49,122; Wesleyans, 36,277; Congregationalists, 9,253; Roman Catholics, 147,627; Mohammedans and other Asiatic creeds, 7,455; the remainder belonged to various minor denominations. For information concerning the aborigines, the native animals, botany, geology, and history of New South Wales, see AUSTRALIA. — See Lang's "New South Wales" (new ed., 2 vols., London, 1875).

NEWSPAPERS, printed sheets published at stated intervals, chiefly devoted to intelligence on current events. Newspapers were preceded in antiquity by the Roman *Acta Diurna*, which were daily, official, written reports of public occurrences; and in modern Europe by periodical publications in manuscript. Of the origin of newspapers in England, Alexander Andrews says ("History of British Journalism," London, 1859): "First we have the written news letter furnished to the wealthy aristocracy; then, as the craving for information spread, the ballad of news sung or recited; then the news pamphlet, more prosaically arranged; then the periodical sheet of news; and lastly the newspaper." The first regular series of weekly newspapers hitherto discovered was entitled "The Weekly Newes from Italy, Germanie, &c." (1622). The "English Mercurie of 1588," long regarded as the first printed English newspaper, was proved a forgery in 1839 and again in 1850 by Thomas Watts of the British museum. Prominently connected with most of the early weekly sheets, which appeared under the name of "Weekly Newes," "Times Newes," "Newes," &c., was Nathaniel Butter, who is regarded as the father of the regular newspaper press. The first attempt at parliamentary reporting was made in 1641; the first advertisement was inserted as early as 1648, and the first paper exclusively devoted to advertisements and shipping intelligence appeared in 1657. The news given in the papers treated chiefly of foreign affairs. Home politics were scarcely discussed till after the abolition of the star chamber in 1641. Various partisan sheets were published during the civil war, chiefly under the name of "Mercuries," and counting among their most eminent editors Needham, Birkenhead, Digby, and Heylin, the last regarded as the ablest of them all. Many of the papers were notorious for their eccentricity and coarseness, and still more for their bitterness. After the restoration the censorship of

the newspapers became more stringent. A semi-official organ, edited by Sir Roger L'Estrange, who was the licenser of the press, and held for some time a kind of monopoly of journalism, was supplanted in 1665 by the "Oxford Gazette," published during the temporary removal of the court to that city on the outbreak of the plague. On the return of the royal family to the metropolis (1666) it appeared as the "London Gazette," and, as the official organ of the government, was placed under the control of the under-secretary of state. The press was for a long time subjected to many persecutions, and the licensing act was not abolished until after the accession of William and Mary. In the mean time the first commercial newspaper, the "City Mercury," was published in 1675; the first literary paper, the "Mercurius Librarius," in 1680; the first sporting paper, the "Jockey's Intelligencer," in 1683; and the first medical paper in 1686. From that year to 1692, 26 new journals sprang into existence, including the first bearing the title of a reform paper, the "Mercurius Reformatus;" the first publication in the style of "Notes and Queries," the "Athenian Mercury;" the first ladies' paper, the "Ladies' Mercury;" the first agricultural and an increasing number of literary journals. Daily newspapers did not make their appearance until the 18th century. The first daily morning newspaper was the "Daily Courant" (1709), consisting of but one page of two columns, and containing five paragraphs translated from foreign journals. The leading London weekly journals at that time were mostly sold for a penny; supplements with the latest news commanded an extra price. Home affairs were then little discussed; foreign news supplied the staple of newspaper information, and correspondents were employed in the principal cities of Europe. In 1726 appeared the first number of the "Craftsman," which obtained for a time a circulation of nearly 12,000 copies. In 1730 200 half sheets a month were issued in London alone, besides daily and weekly journals. The aggregate number of copies of newspapers sold in England in 1757 was about 7,000,000; in 1760, 9,000,000; and in 1767, upward of 10,000,000. The "North Briton," edited by Wilkes, who was so conspicuous in consolidating the liberty of the press, first appeared in 1762. The "Englishman," established in the same year, attracted attention in 1766 on account of several of Burke's contributions. The letters of Junius began to appear in 1767 in the "Public Advertiser," and contributed powerfully to raise the political importance of the daily press. The leading daily journals of London in the latter part of the 18th century were the "Morning Chronicle" (founded in 1769), the "Morning Post" (1772), the "Morning Herald" (1781), the "Times" (1785), and the "Morning Advertiser" (1794). The "Times," destined to eclipse all other English journals, originally appeared under the name of the

"Daily Universal Register." It was printed and published by John Walter of Printing House square, who, in the impression of Jan. 1, 1788, added to the original name of his journal that of the "Times." Its circulation at the beginning of this century was only 1,000 copies a day, while that of several others was about 4,000. The "Morning Chronicle" and "Morning Post" were at this time the most important of the London journals, and both possessed great literary merit as well as political influence; Coleridge, Southey, Lamb, Wordsworth, and several of their friends writing for the "Post," while Fox and Sheridan were among the "Chronicle's" contributors. In 1813 there were 56 journals in London, of which 8 were published every morning, 7 every evening (the first evening paper having been established as early as 1778), 7 every other evening, 16 every Sunday (the first Sunday paper had appeared in 1788), and 18 weekly on other days. The "Courier" was then considered the best informed daily journal. The remarkable success of the "Times" was ascribed to a firm attitude toward the government and a freedom from party ties; to an efficient system in securing the earliest transmission of news; to a constant care in improving the mechanical resources of the paper, and in securing the best available talent; and above all to the application of steam power to its printing press in 1814, the number for Nov. 29 in that year being printed on one of König's newly invented machines. In 1815 the number of newspapers in the United Kingdom amounted to 252, viz.: 55 in London (15 daily), 122 in other parts of England and Wales, 26 in Scotland, and 49 in Ireland; and Cobbett's weekly "Political Register," established at the beginning of the century, was sold in 1817 to the extent of 50,000 copies a week. After the close of the Napoleonic wars the growth of English journalism was exceedingly rapid, and in the course of a decade the increase both in the number and circulation of newspapers was very great. On Jan. 29, 1829, the "Times" came out on a double sheet, composed of 8 pages of 48 columns. The reform excitement greatly increased the sale of that and of other journals, and nearly 13,000,000 copies of newspapers passed through the post office in 1830. In 1832 there was one newspaper to every 55,000 of the population, against one to 90,000 in 1821, and one to 110,000 in 1782. The free expression of political opinion through the press was rather increased than checked by the fact that the editors of various unstamped newspapers, among them the violent "Poor Man's Guardian," were prosecuted during the discussion on the reform bill. In 1833 the number of journals published in the United Kingdom was about 400, and of copies passing through the post offices of Great Britain and Ireland nearly 42,000,000.—A new stimulus was given to newspaper enterprise in 1836 by the reduction of the stamp duty from four

pence to a penny, causing in the first year of the full operation of the new act an increase of 8,000,000 in the stamps issued, and of 61 in the number of newspapers, which a year before the reduction was 397, and a year afterward 458. Fourteen of the new journals were established in London alone, including a short-lived ultra-liberal morning newspaper called "The Constitutional" (in place of the old "Public Ledger"), of which Laman Blanchard was the editor, Thornton Hunt the sub-editor, Douglas Jerrold the dramatic critic, and Thackeray the Paris correspondent. A socialist organ was published by Robert Owen, the "New Moral World," and a Chartist organ by Feargus O'Connor, the "Northern Star." The "Economist," celebrated for its collections of financial and commercial statistics and disquisitions, was established in 1834 by James Wilson (died in 1860), whose ability, first manifested in the conduct of this journal, raised him to the secretaryship of the treasury. The "Illustrated London News," the first of the great illustrated newspapers, was founded in 1842 by Herbert Ingram. The stamps on newspapers in the United Kingdom increased from 65,000,000 in 1843 to 71,000,000 in 1844. The railway mania produced in London many newspapers devoted to railway matters, their number amounting to about 30 in 1845, but only three of them survived the crisis of 1846. The "Daily News" was established in 1846, under the editorship of Charles Dickens; he was soon succeeded by Charles Wentworth Dilke, who established in connection with it the "Express" evening journal. The "Daily News" at one time enjoyed a circulation second only to that of the "Times." The ordinary daily circulation of the latter rose from 23,000 in 1846 to 29,000 in 1848, and to 36,000 in 1852. In 1854, during the Crimean war, its average daily circulation was 51,648, about double the aggregate of all the other daily morning journals, which was only 26,268. The number of newspaper stamps issued in 1854 in the United Kingdom was about 120,000,000. In 1855 the stamp duty was totally abolished as a tax, making it optional with the publishers to use the stamp as a means of paying postage on such copies of their impressions as were to be sent through the mails. The five-penny papers, except the "Times," which followed their example later, immediately reduced their price to 4d., the six-penny weekly papers to 5d., and the three-penny papers (which were established on the abolition of the four-penny tax in 1836) to 2d.; while a great number of penny weekly and daily papers sprang up. The prices of the leading metropolitan dailies have since been still further reduced, as will be seen by consulting the list given below; but of the many new daily papers established since 1855, only the "Daily Telegraph," the "Standard," and the "Pall Mall Gazette" have taken a permanent place among the leading London journals. The following is a list of the principal

daily newspapers now (1875) published in London, with their prices and some indication of their character :

MORNING PAPERS.

- Times**—established Jan. 1, 1788; 3*d.*; politics independent; free-trade.
DAILY TELEGRAPH—established June 2, 1855; 1*d.*; politics liberal. Remarkable for enterprise in collecting news, and for its correspondence.
STANDARD—established June 29, 1857; 1*d.*; organ of the conservative party.
DAILY NEWS—established Jan. 21, 1846; 1*d.*; politics liberal and independent. Its correspondence and critical articles have always held a high rank.
MORNING POST—established in 1772; 3*d.*; politics liberal-conservative; the chief fashionable journal, devoted largely to social topics.
MORNING ADVERTISER—established Feb. 8, 1794; 3*d.*; politics liberal and independent; largely devoted to the interests of merchants and tradesmen.
PUBLIC LEDGER—established in 1759; 2½*d.*; exclusively commercial.
FINANCIER—established in March, 1870; 2*d.*; financial and commercial.
DAILY RECORDER—established in November, 1869; 3*d.*; financial.

EVENING PAPERS.

- EVENING STANDARD**—established in 1827; 1*d.*; now forms an evening edition of the "Standard."
PALL MALL GAZETTE—established in 1865; 2*d.*; politics liberal; remarkable for literary ability, and in part a literary review.
ECHO—established in December, 1868; ½*d.*; independent; general newspaper.
GLOBE—established in 1803; 1*d.*; politics conservative.
SHIPPING AND MERCANTILE GAZETTE—established in January, 1836; 5*d.*; commercial.

There are also several local daily papers, like the "Daily Chronicle and Clerkenwell News" and others, devoted to London interests exclusively, or to particular localities. The "London Gazette," the organ of publication for official acts, appointments, &c., appears twice, and several other papers (in one or two cases summaries of news for the foreign mails) thrice a week. There are more than 150 weekly papers in London; they include "Punch" and such literary organs as the "Athenæum," "Saturday Review," "Spectator," "Academy," &c., and a very great number of papers devoted to special branches of science and art and occupations and classes of society. Among the weekly papers which reach the highest circulation are the "Illustrated London News" and the "Graphic," the latter an illustrated paper of very great artistic merit. Both devote much space to the illustration of current events.—French newspapers date their origin from the publication of the *Mercure françois* (1605-'45), a kind of historical compilation. Their more immediate prototype was the *Gazette* issued by Théophraste Renaudot in 1631, and continued under the name of *Gazette des Recueils* and *Gazette de France* till about 1789, appearing generally once, and for some time twice a week, and at length daily. A poetical newspaper, which chiefly treated of local gossip and scandal, was published by Loret for about 15 years during the second half of the 17th century. The *Mercure galant* (1672), a species of literary journal, was succeeded by the *Nouveau Mercure* and *Mercure de France*, which

was discontinued in 1815. The *Journal Étranger*, edited by the abbé Arnaud and Frémois, and having among its contributors Rousseau, Grimm, and Prévost, existed till 1763, when Arnaud became one of the editors of the *Gazette de France*. The *Moniteur*, the official organ of the government, was founded in 1789 and treated of moral and political subjects; while some of its contemporaries, especially the notorious *Nouvelles à la Main*, contained a budget of scandalous intelligence. From the close of the 17th century to the middle of the 18th, many weekly and monthly journals were published in Paris, chiefly literary and scientific, with which the most eminent men of France were connected. The first daily political newspaper was the *Journal de Paris, ou Poste du Soir* (1777–1825). The first political editor who attracted general attention was Linguet, who was connected from 1774 till 1783 with the *Journal de Politique et de Littérature*, better known under the title of *Journal de Bruxelles*, although it was issued in Paris. The famous *Courrier de l'Europe* was published in London (1776-'89) twice a week for 6*d.* a number; on its staff were Morande, Brissot, and the count de Montlosier. The revolution gave a powerful impulse to French journalism, and Mirabeau's *Courrier de Provence* (1789) became the precursor of thousands of newspapers of every description, the most violent of which was Marat's *Ami du Peuple*. After the 18th Brumaire all the political journals of Paris excepting 13 were suppressed by the first consul, and under the empire only five were permitted to appear, viz.: the *Moniteur*, *Gazette de France*, *Journal de Paris*, *Journal des Débats* (under the temporary name of *Journal de l'Empire*), and *Petites Affiches*. The condition of the press did not much improve after the restoration. The censorship was replaced in 1825 by securities to be furnished by each proprietor of a Parisian journal to the extent of 200,000 francs, and somewhat less in the provinces. The increase of the stamp duty from 5 to 10 centimes caused the price of the leading journals to be raised from 72 to 80 francs a year. The *Journal des Débats* was originally founded Aug. 29, 1789, by the printer Baudouin, Barrère, and Louvet, passed in 1800 into the hands of Louis François Bertin the elder, and has since remained the property of the Bertin family. It was conspicuous for the support of existing authorities, but after the restoration it advocated a moderate liberalism. Its literary and scientific departments have always held the highest rank; and, besides many others of nearly equal fame, it has counted among its regular contributors Royer-Collard, Malte-Brun, Geoffroy Saint-Hilaire, Saint-Marc Girardin, Jules Janin, Michel Chevalier, Philarrète Chasles, Prévost-Paradol, and Hippolyte Taine. The *Journal des Débats* has continued to hold its prominent place through all the political changes of recent years, and still advocates a policy of moderate liberalism. One

of the most prominent journals during the latter part of the restoration was the *Globe*, which counted among its contributors Guizot, Cousin, Jouffroy, and the duke de Broglie, and afterward Rémusat, Saint-Marc Girardin, and Carnot. Many of its writers were brought into political prominence by the revolution of 1830, after which the *Globe* appeared for a few years as an organ of St. Simonism. The *Constitutionnel*, established in the early period of the restoration, opposed the elder Bourbons, and reflected in a great measure the views of aspiring and influential politicians of the higher middle class and of the military and civil aristocracy created by Napoleon. Thiers and Mignet wrote largely for this journal until toward the end of the restoration, when they found a more energetic outlet for their liberal opinions in the *National*; and shortly after the July revolution the *Constitutionnel* lost its political influence. The *National*, founded at the beginning of 1830, rapidly gained importance through the influence of Louis Philippe, Talleyrand, Laffitte, and other opponents of the elder branch of the Bourbons; and its first editorial staff comprised Thiers, Mignet, and Carrel. It contributed powerfully to the overthrow of the government of Charles X., soon after which it became, under the sole editorship of Carrel, equally opposed to that of his successor. Carrel was succeeded by Bastide, and the latter by Armand Marrast; and the *National* took as prominent a part in the overthrow of Louis Philippe as it had in that of Charles X. The foundation in 1836 of the *Presse*, by Émile de Girardin, at 40 francs a year, half the price of the leading journals, called the cheap press into existence. A powerful means of the success of the *Presse* and of the *Siècle*, which also reduced its price to 40 francs, was the publication of novels in their *feuilletons*, for which the services of Eugène Sue, Alexandre Dumas, and other celebrated writers were enlisted at extravagant prices. The fortunes of the *Constitutionnel* were also revived under the editorship of Dr. Véron, by the reduction of its price, and by the publication in its *feuilletons* of *Le Juif errant*, for which he paid Eugène Sue 100,000 francs. Sainte-Beuve was for a long time its literary critic. Under the direction of Véron, the *Constitutionnel* increased its circulation to upward of 20,000; and the general influence of the cheap press, and its handmaid the *feuilleton*, increased the aggregate of subscribers from 70,000 in 1835, when the number of the principal daily journals in Paris was 20, to 180,000 in 1845, when there were 26. The *Siècle* became the favorite paper of the lower middle classes, and reached in 1846 a circulation of upward of 40,000. Within three months after the revolution of 1848, about 400 new journals sprang into existence, many of which were ultra socialistic or democratic. The principal organ of the moderate republicans was still the *National*, and of the more radical party

the *Réforme*, founded by Godefroy Cavaignac and edited by Flocon. After June, 1848, the newspapers were again required to deposit security and pay stamp duty, and many were consequently obliged to stop. The estimated daily circulation of newspapers in Paris in 1850 was: of republican organs, 129,000; Orleanist and legitimist, 83,000; Bonapartist, 65,000; total, 277,000. The *coup d'état* of Dec. 2, 1851, terminated the existence of the *National*, as well as of many other liberal organs. The restrictions imposed under the second empire were extremely unfavorable to the growth of the French political press, and comparatively few new papers attained other than literary importance during the earlier years of Napoleon's rule. In 1853, instead of the former multitude of Parisian daily journals, there were but 14 having the slightest importance; of these the following are noteworthy: the *Journal des Débats*, *Presse*, *Siècle*, *Constitutionnel*, *Pays*, *Patrie*, *Univers*, *Assemblée nationale*, *Gazette de France*, *Union*, and *Charivari*. The *Moniteur* was the official journal till 1869, when it was replaced by the *Journal officiel*. Of later origin than those just named were the *Temps*, *France*, *Avenir national*, *Opinion nationale*, *Liberté*, *Courrier français*, *Époque*, *National*, *Paris-Journal*, the long prominent *Gaulois*, and the very successful *Figaro*. All of these met with some success and influence, though only the last has attained any remarkable permanent position. Nearly all were subjected to frequent prosecutions, and several were suppressed. It was only in the later years of the empire that the political press again became a formidable power in France. Rochefort's *Lanterne* (1868), a weekly publication entirely devoted to attacks upon the emperor and his party, marks an epoch in the history of French journalism, and attained a most extraordinary success and influence. The *Rappel*, *Cloche*, *Marseillaise*, *Journal de Paris*, and many other political sheets sprang up and became involved in endless difficulties with the government; but their influence was great and their circulation in some cases phenomenal. The revolution of Sept. 4, 1870, had much the same influence upon the French press as that exercised by the proclamation of the republic in 1848; calling into existence a multitude of new papers, many of which attained considerable temporary success in spite of the Prussian siege and the disturbed state of the capital. Such were the *Vérité*, *Constitution*, *Mot d'Ordre*, *Patrie en Danger*, *Bien public*, and *Soir*. The communal insurrection, largely excited by and under the partial guidance of journalists of the revolutionary order, gave rise to an immense number of popular journals, most of them of the most violent character; but only one or two survived the downfall of the commune. Prominent among them were the *Ori du Peuple*, *Paris libre*, *Sociale*, *Bonnet Rouge*, *Commune*, *Affranchi*, *Réveil du*

Peuple, Père Duchêne, and Montagne. Among the more prominent journals which have appeared since the suppression of the commune and the return of political affairs to the ordinary channel, are the *République française*, the *Radical* (which was suppressed after a brief existence), and the *XIX^{me} Siècle*. In all, Paris has 791 periodicals, of which 113 are political, 90 scientific, 78 religious, 58 devoted to fashion, 42 legal, 39 financial, 14 military, 9 naval, and 8 architectural.—Italian newspapers are traced to the early *gazzette* of Venice of the 16th century, many volumes of which in manuscript are preserved in the Magliabecchian library, while one printed copy dated 1570 is in the British museum. In more modern times the principal newspapers consisted at first only of those serving as official organs of the respective authorities, as the *Diario di Roma* and *Gazzetta di Napoli*. The *Voce della Verità*, published in Modena (1831), was ultra conservative; and the *Antologia*, established ten years earlier in Florence, was ultra liberal. The total number of Italian newspapers in 1836 was 171; in 1845, 205. After the accession of Pope Pius IX. in 1846, Italy produced an enormous crop of new journals, chiefly revolutionary, which were discontinued in 1849; and with the exception of Sardinia, the Italian press was again put under restraint until 1859-'60. The changes of those years conferred an almost complete freedom upon the whole Italian press, and called into existence a great number of new political journals. In 1859 the Turin *Opinione*, which is still an important Italian journal, reduced its price to one sou. With the *Diritto*, another important paper, the *Opinione* was removed to Florence in 1865, on the removal of the capital to that city. Between that year and 1870 Florence remained the central point of Italian journalism, and all parties were represented there by political newspapers; but on the second transfer of the seat of government to Rome nearly all of these again removed thither, and are now published in the new political centre. The chief of them, besides the *Opinione* already referred to, are the official organ, the *Gazzetta ufficiale del Regno d'Italia*, and *L'Italie*, published in French and looked upon as the organ of the department of foreign affairs.—The first regular newspaper in Spain was the court journal, *Diario de Madrid*, established about the middle of the 18th century. After the establishment of the liberty of the press in 1834, nearly 20 political journals were started in Madrid alone, and more than 40 were published there in 1844, the *Heraldo* (*moderado* organ) circulating 7,000 daily. Satirical and humorous papers have played an important part in the history of Spanish journalism, and many of the ablest writers are engaged in the conduct of literary, scientific, artistic, and religious papers. About 30 journals were published at the beginning of 1861 in Madrid, the most important of which were the *Clamor publico* and *España*; and in

1863 the total number in Spain was 279, of which 93 were devoted to special scientific or literary branches. After the political reaction of 1866 all the more influential liberal papers were suspended. Many of them were renewed in 1868, but without force or vigor, and suffering constant official persecution. At this time the *Diario español*, *Política*, and other journals, represented the liberal party; the absolutist organs were the *Esperanza*, *Pensamiento español*, *Lealtad*, and several other papers; the *Español* and *España* were ministerial organs. Portuguese newspapers are confined to the organ of government, the *Diário do Governo*, and some half dozen other journals published in Lisbon, and to a corresponding number in Oporto and other cities.—German newspapers were preceded by irregular publications of news, a specimen of the oldest of which, dated in 1494, is preserved in the university library of Leipsic. Summaries of events, generally in Latin, and with such titles as *Relationes Semestrales*, *Relationum Historicarum Pentapulus*, &c., were frequently published at stated intervals in Germany during the 16th century. The first regular journal was a weekly paper established in 1615 by Egenolph Emmel, a bookseller at Frankfort, and published at his own expense. In imitation of this the *Frankfurter Oberpostamts-Zeitung*, the oldest successful German paper, was founded in 1616 by the postmaster, Johann von der Birghden. Beginning as a weekly, it was many years later made a daily paper, and as such existed till 1866. This was followed by newspapers in all the leading cities of Germany, and by the middle of the 17th century they had become subject in most cases to government censorship, and generally contained little besides official publications. One considerable journal, *Der Hamburgische Correspondent*, was founded in 1714; but with this exception the history of the German press is unimportant until the period of the French revolution, when many political papers sprang up in Germany as elsewhere. The *Vossische Zeitung*, still an important journal of Berlin, and the *Spener'sche Zeitung*, which held a prominent place until the year 1874, when it stopped publication, had been founded before that period, but were almost exclusively literary until the events of 1789-'93. In 1798 appeared at Tübingen the *Allgemeine Zeitung* (now of Augsburg), destined to surpass in success and permanence all other German journals. It was founded by Cotta the publisher, and was at first called *Neueste Weltkunde*, but almost immediately changed to its permanent title. It suffered from repeated government persecutions on account of its outspoken character; and in 1799 it was transferred from Tübingen to Stuttgart, in 1803 to Ulm, and in 1824 to Augsburg, the present place of publication. Its conductors have been successively Posselt, Huber, Stegmann, Kolb and Mebold, Kolb and Altenhöfer, and since Kolb's death in 1865 Altenhöfer alone. After the beginning of the

present century the growth of the German press was very rapid, though for a time the French rule prevented the existence of any really national school of journalism, and political papers of consequence only appeared after 1813. Kotzebue's *Russisch-deutsches Volksblatt* (Berlin), Niebuhr's *Der Preussische Correspondent*, Brockhaus's *Deutsche Blätter*, Görres's *Der Rheinische Mercur*, and *Der Deutsche Beobachter* of Hamburg were among the most influential journals of this period, though most of them were short-lived. Vienna had at this time the Austrian official organ, the *Wiener Zeitung*, and *Der Oesterreichische Beobachter*, which was regarded as semi-official. In Berlin, the *Preussische Staatszeitung* was founded about 1816. In 1819 a decree of the Bundestag placed the press throughout Germany under an exceedingly strict censorship, and thus its rapid increase was again suddenly checked. The French revolution of 1830 gave a fresh impetus to its progress, and called into existence several radical journals, as Siebenpfeiffer's *Westbote*, Wirth's *Deutsche Tribune*, and *Der Freisinnige* by Rotteck and Welcker; but most of them were suppressed in 1833. Among the ablest journals published between that period and the revolution of 1848 was the *Rheinische Zeitung*, established in Cologne in 1841, where it continued until 1850. The increase from 1840 to 1848 was steady and moderately rapid. Several noteworthy journals attained success during this period, the more important being the *Leipziger Allgemeine Zeitung* (begun in October, 1837), which in 1843 changed its name to that of *Deutsche Allgemeine Zeitung*, and the *Kölnische Zeitung*. The *Bremer Zeitung* and *Weserzeitung* also gained their first importance at this time. The revolution of 1848 caused the birth of a great multitude of journals, most of them of the violent political order, and very short-lived. In 1849 the total number of German newspapers, excluding purely scientific and literary journals, was 1,551. This includes the German papers of Austria, Switzerland, and the Baltic provinces of Russia. From that date the number steadily increased; in 1855 it was estimated at 1,600, besides 860 scientific and literary journals; and in 1868 the number of journals of all kinds was 2,566, of which 761 were entirely political. The wars of 1866 and 1870-'71, the unification and rapid advance in power of the German empire, and other causes have contributed to foster the growth of the German press. Its gain in influence in Europe has been accompanied by a corresponding increase in ability, and it is now more prominent than ever as a political power. In March, 1872, the most trustworthy statistics obtainable gave the number of German journals as follows (excluding all purely literary and scientific publications not properly included under the name of newspaper): in Prussia, 951; Bavaria, 250; Saxony, 119; Würtemberg, 102; Baden, 72; Hesse, 53; Mecklenburg-Schwerin, 51; other states of the empire,

145; total, 1,743. The principal dailies in Berlin (1875) are the *Vossische Zeitung*, *Volkszeitung*, *Staatsbürgerzeitung*, *Nationalzeitung*, *Neue Preussische Zeitung* (commonly known as the *Kreuzzeitung*), *Norddeutsche Allgemeine Zeitung* (semi-official), *Post*, and *Zukunft* (democratic). The *Börsenzeitung* and *Bank- und Handelszeitung* are the principal financial journals. The *Staatsanzeiger* and (since 1871) the *Reichsanzeiger* are official, corresponding to the London "Gazette." The *Intelligenzblatt* is an important local sheet, and is the favorite for advertisements. *Kladderadatsch* is a humorous weekly corresponding to the London "Punch," and there are great numbers of other weekly papers. In all, Berlin in 1871 published 175 newspapers, including weeklies and similar periodicals. Leading journals of the empire outside of Berlin are the very influential *Augsburger Allgemeine Zeitung*, already mentioned, the *Kölnische Zeitung*, the *Hamburger Correspondent*, the *Deutsche Allgemeine Zeitung* of Leipsic, and the *Stettiner Zeitung*. The Austrian press is much inferior to that of the German empire, and has had its growth almost entirely in Vienna. In 1846 there were in the whole territory of Austria but 155 periodicals of all classes, and among them only 41 political journals, most of which were practically made up from the *Wiener Zeitung*, the official government organ. The revolution of 1848 called forth in Austria as elsewhere a multitude of political newspapers; but they were unimportant and short-lived. Only within the last decade has Austrian journalism attained a greater influence; and this is now almost entirely centred in the Vienna press. The chief journals of that city, besides the official *Wiener Zeitung*, are the *Neue freie Presse* (which in ability and influence rivals the foremost journals of the German empire), the *Presse*, and the *Abendpost*; and there are several cheaper journals of wide circulation, such as the *Morgenpost*, *Fremdenblatt*, and *Vorstadtzeitung*. Outside of Vienna are the *Bohemia* at Prague, the *Mährischer Correspondent* at Brünn, and the *Triester Zeitung* at Trieste.—The first regular series of Hungarian newspapers was published in Latin in 1721, and the first in the vernacular tongue appeared in 1781 in Presburg. The principal Hungarian journals shortly before the revolution of 1848-'9 were the *Jelenkor* ("Present Age"), the organ of Count Széchenyi, *Világ* ("Light"), *Budapesti híradó* ("Buda-Pesth Intelligencer," edited by Count Emil Dessewffy), *Pesti hírlap* ("Pesth Journal," edited by Kossuth), and the *Pesther Zeitung*, in German. Among the most celebrated journals which sprang up during the revolution were the *Közlöny* ("Organ"), the revolutionary *Moniteur*, and *Kossuth hírlapja* ("Kossuth's Journal"), edited by Bajza. Among the principal newspapers which have appeared in Hungary since the revolution are the *Budapesti napló* ("Buda-Pesth Diary"), edited by

Baron Kemény, the *Hon* ("Fatherland"), edited by Jókai, and the *Pesther Lloyd*, in German. In 1868 the total number of journals and similar periodical publications was 205, 53 being political; 111 were printed in Hungarian, 29 in Slavic languages, 55 in German, 6 in Roumanian, and 4 in Italian.—The first Turkish newspaper appeared in French in 1795, but the actual founder of journalism in Turkey was Alexandre Blacque (father of Blacque Bey, late Turkish minister to the United States), who established at Smyrna in 1825 the *Spectateur d'Orient*, which, under its subsequent title of *Courrier de Smyrne*, exerted considerable influence during the Greek revolution. The official journal has appeared in French since 1831 under the title of *Moniteur Ottoman*, and in Turkish since 1832 under that of *Ta'quimi Vaqâi*. The leading Constantinople journals are now the *Journal de Constantinople* in French, the *Dyeridei Havadis* in Turkish, and the "Levant Herald" and "Levant Times" in English; besides which several other papers in French, Italian, modern Greek, and Armenian are published in various parts of the Ottoman empire. A modern Syrian newspaper has been published by missionary enterprise since 1850 at Oroomiah. Armenian journals have existed at various periods in Vienna, Venice, Transcaucasia, Calcutta, Madras, and Singapore, some of which are still in existence.—The origin of Greek newspapers dates from the national independence. The centre of Greek journalism is Athens. The number of periodicals published in Greece is more than 80, of which about 75 are in the Greek language. The leading political journal of Athens is the *Spectateur d'Orient*, a semi-monthly journal published there in French since 1852. There are journals published at Syra, and in the Ionian islands; there are several publications in English and Italian as well as in Greek.—Newspapers were established in the Low Countries before they were known in Great Britain, France, or Germany. The earliest appears to have been the *Nieuwe Tydinghen*, published at Antwerp by Abraham Verhoeven in 1605. No copy of this journal anterior to 1619 is now known to exist, and it is somewhat uncertain whether it was from the beginning a regular periodical. It was followed by the *Port-Tydinghen*, which was published between 1637 and 1644, and was the foundation of the *Gazette van Antwerpen*, which continued till 1827. At Brussels at least two newspapers were in existence between 1637 and 1645. The *Annales politiques* of that city was a famous journal of the last century, and the Austrian government subscribed for 1,200 copies of it annually. It was so popular that a pirated edition was regularly printed and circulated. The most noted Belgian journals at the present day are the *Moniteur belge*, the official paper, the *Indépendance belge*, an organ of the liberal party, and *Le Nord*, a Russian organ, published in Brussels, and conducted with much abil-

ity. Independent newspapers are the *Écho de Bruxelles* and the *Journal de Belgique*, both published at Brussels. Holland has numerous newspapers, but none of much political importance. The principal ones are the *Handelsblad* of Amsterdam, the *Courant* of Haarlem, and the *Staats Courant* and the *Journal de la Haye*, both published at the Hague.—In proportion to its population, Switzerland has a more productive periodical literature than almost any other European nation; and the Swiss political and general press is especially flourishing. In 1868 there were 375 journals of all classes, of which 246 were printed in German, 116 in French, and 13 in Italian. Most of these papers are circulated in small neighborhoods, discuss local affairs, and have little political influence; but a few, such as *Der Bund* in Bern, the *Neue Züricher Zeitung*, the *Journal de Genève*, and the *Gazette de Lausanne*, are more widely known and read.—Peter the Great took a personal part in the establishment of the first Russian journal, published at Moscow in 1703. Journals appearing once or twice a week are published in almost every chief city of the Russian governments; but the principal seats of Russian journalism are St. Petersburg and Moscow. There is no journal in Russia which corresponds exactly to the French *Moniteur*. The "Gazette of the Senate" is official in regard to the publication of laws, ukases, and other regulations of a strictly administrative character. Other official organs are the *Journal de St. Pétersbourg*, published in French, for information in regard to the imperial court and to foreign affairs, and the "Northern Post," concerning the interior administration. During the reign of Nicholas the "Northern Bee" had considerable influence. The *Invalide russe* is a semi-official organ in military affairs. The "Police Gazette" of St. Petersburg relates chiefly to police regulations. Among the other daily journals are the "Son of the Fatherland," the "St. Petersburg Gazette," and the "Commercial Gazette," which last is published both in Russian and German; and the most prominent of them all is the *Golos* ("The Voice"). The most popular humorous journal is *Iskra* ("The Spark"). The principal daily journals of Moscow are the "Russian Messenger," the "Police Gazette," and the "Moscow Gazette," the oldest and most influential political journal of the empire, edited by Katkoff. In the Baltic provinces daily journals are published in German, particularly in Riga. The journals of Finland are published in Swedish, and those of Poland and Lithuania in Polish. Owing to the restrictions on the press, however, the Polish journals of Warsaw and Wilna are insignificant compared with those published in Galicia, such as the *Cracow Czas* ("Times") and the *Lemberg Gazeta Narodowa* ("National Gazette"), or in Posen. In Kazan a journal is published in Tartar, in Astrakhan one in Kalmuck. Odessa has daily

journals in French and Italian.—The earliest newspaper in Sweden was the *Ordinarie Post-Tidning*, established in 1643; but the journals had little political influence till 1820, when the *Argus* appeared at Stockholm. Since then the *Fäderneslandet* and the *Aftonbladet* have been the principal journals of the capital, the former conservative, the latter liberal. There is a newspaper published in every considerable town of the kingdom; the total number of periodicals published in 1867 was 179. The *Christiania Intelligentsedler*, founded in 1763, is the oldest newspaper in Norway. The *Constitutionnelle* at Bergen is the organ of the government; and the *Morgenblad*, established at the same place in 1819, is the journal of the popular party. The oldest newspaper of Denmark is the *Berlingske Tidende*, which was first published in 1749 in German, but now appears in Danish. Until 1830 Copenhagen had but two journals, and those of little influence. In 1849 the number of political papers in the kingdom was 36. The total number of periodicals is now upward of 200.—In China, a species of newspaper has existed at Peking for centuries under the title of *King Chau*, "Court Transcripts," which is commonly called by Europeans the "Peking Gazette." It is compiled from the papers presented before the general council of the empire, and constitutes the principal medium available to the people for ascertaining what is going on in the country. Couriers are despatched to all parts of China bearing copies of these papers to the high provincial officers. Anybody is permitted to print these documents without note or change, and to sell them to the people. In the provinces thousands of persons find employment in copying and abridging them. In 1827 an English weekly newspaper, the "Canton Register," was established at Canton; and in 1836 a similar journal, the "Canton Press," made its appearance. At present the "North China Mail" and "Shanghai Herald" at Shanghai, and the "China Mail" at Hong Kong, are the principal English newspapers in that quarter. In the island of Penang the "Prince of Wales Island Gazette" was founded in 1805, suspended for some years, and revived in 1833. At Singapore, the "Singapore Chronicle" was established in 1823; at the same place the "Straits Times" is now published.—In India, "Hicking's Gazette" was established at Calcutta, in January, 1871; and in 1795 the Bengal *Hurkuru* made its appearance and still continues, the oldest of the Indian newspapers. It became a daily in April, 1819. Until 1835 the press in India was restrained either by a censorship or by the right assumed by the East India company of deporting to Europe obnoxious editors. (See BUCKINGHAM, JAMES SILK, and DUANE, WILLIAM.) A law in 1835 removed all arbitrary restrictions upon the press. On the outbreak of the sepoy mutiny in 1857, an act was passed prohibiting the use of the press except under a

license; this act, however, was by its term limited to one year from date. The leading English journals now in existence in Hindostan are the "Friend of India" at Serampore, the "Gazette" and "Englishman" at Calcutta, the "Athenæum" and "Spectator" at Madras, the "Herald" at Bangalore, the "Times," "Telegraph," and "Gazette" at Bombay, the "Gazette" at Delhi, the "Observer" at Poonah, and the "Chronicle" at Lahore. At Calcutta and at some other cities there are newspapers in the native languages.—The first newspaper in Australia was the "Sydney Gazette and New South Wales Advertiser," founded in 1803 by George Howe. At present a great number exist in the various colonies, of which the principal dailies are: at Melbourne, the "Argus," the "Age," and the "Herald;" at Sydney, the "Herald" and the "Empire." In New Zealand the "Southern Cross," "New Zealand Gazette," and a number of other papers are published. Several are published in Tasmania, at Hobart Town and Launceston, and also several in Cape Colony, the first of which was the "South African Commercial Advertiser," established in 1824.—In the Hawaiian islands several newspapers are published in Hawaiian and English. The chief of the latter are the "Honolulu Gazette" and "Pacific Advertiser." In Japan there are several papers in English, the "Japan Herald" of Yokohama being the best known; in the native language there is an official government gazette, and within a few years several political journals, modelled upon those of Europe, have been begun at Tokio (Yedo).—Among the countries of South America, Brazil, with a total of about 60 dailies and a very large number of weeklies and periodicals, has the most important press. The leading papers are of course published at Rio de Janeiro; the number of periodical publications of all kinds in that city is 58. The leading dailies are the *Diario official* and the *Jornal do Rio*. There are also four English and four French newspapers, and one German. An influential daily, the *Diario de Bahia*, is published at Bahia. The press of the Argentine Republic, having its chief activity in Buenos Ayres, ranks next to that of Brazil. "The Standard," published in English, is the leading daily; others are the *Tribuna*, the *Nacional*, and the usual *Diario official*. There are also papers in French, German, and Italian. Venezuela has several important dailies, chief among them the *Federalista* and the *Opinion nacional*, published at Carácas. Peru has a very influential press, the *Comercio* and *Heraldo* of Lima having a wide circulation outside the country as well as in it. In all, Peru has nearly 40 journals. In Chili the *Ferrocarril*, *Independiente*, and *Mercurio* are the most important among the eight dailies of Santiago. Valparaíso has four dailies, of which the *Mercurio*, *Patria*, and "West Coast Mail" are important. The press of the United States of Colombia is unimportant; the papers

are numerous, but very ephemeral. The longest-lived and best known is the *Tradiccionista* of Bogotá. The "Panama Star and Herald," which can hardly be classed as a Colombian paper, has considerable commercial importance. In Mexico the oldest and most important daily is the *Siglo XIX.*; there are also the *Universal*, *Revista Universal*, *Idea Progresista*, and *Iberia*, all published in the city of Mexico. At Vera Cruz the *Pensamiento* is an important paper. In Cuba the chief journals are the following, at Havana: *Diario de la Marina*, *España*, *Progreso*, and *Voz de Cuba*. Three dailies are published at Cienfuegos, two at Santiago, two at Matanzas, and two at Sagua la Grande.—The first American newspaper was issued at Boston, Sept. 25, 1690. It was printed by Richard Pierce and published by Benjamin Harris, and was intended to be issued once a month, but was immediately suppressed by the authorities. The only copy known to be in existence is in the state paper office in London, and it is headed "Publick Occurrences, both Foreign and Domestick." The "Boston News Letter," published by John Campbell, appeared April 24, 1704, and continued to be issued weekly till 1776. It was followed by the "Boston Gazette," Dec. 21, 1719; and the "American Weekly Mercury" was issued by Andrew Bradford at Philadelphia, Dec. 22, 1719. On Aug. 17, 1721, James Franklin, elder brother of Benjamin Franklin, established at Boston the "New England Courant" (weekly), which soon became involved in a violent controversy with the Rev. Increase Mather and other ministers on the subject of inoculation, and was so free in its remarks on public affairs, that in 1722 the legislature issued an order forbidding James Franklin "to print or publish the 'New England Courant' or any other pamphlet or paper of the like nature, except it be first supervised by the secretary of this province." James Franklin's name was consequently taken from the paper, and that of Benjamin, then but 16 years of age, and an apprentice in the office, was substituted. In the "Courant" he began his literary career, and at this period he was one of the most frequent and pungent of its writers. On Oct. 16, 1725, William Bradford, father of Andrew Bradford of Philadelphia, began the publication of the "New York Gazette," the first newspaper issued in that city. In 1728 Benjamin Franklin established in Philadelphia the "Pennsylvania Gazette," which continued under different publishers till Nov. 3, 1845, when it was merged in the "North American." In 1754 four newspapers were published in Boston, two in New York, two in Philadelphia, and the "Virginia Gazette" at Williamsburg, which was first issued in 1736 by William Parks, who had previously published for nine years the "Maryland Gazette" at Annapolis. In 1776 seven were published in Massachusetts, one in New Hampshire, two in Rhode Island, four in Connecti-

cut, four in New York, nine in Pennsylvania, two each in Maryland, Virginia, and North Carolina, three in South Carolina, and one in Georgia—in all, 37. These were all weeklies, with the exception of the "Advertiser" of Philadelphia, which was semi-weekly. During the revolution the principal journal in Boston was the "Gazette," established in April, 1755. In this journal John Adams, under the signature of Novanglus, wrote in 1775 a series of papers in defence of the colonial cause. The "Massachusetts Spy," edited by Isaiah Thomas, the historian of American printing, was established in Boston March 7, 1771, and removed to Worcester in 1775, where it is still published under the title of the "Worcester Spy." In New York, during the revolution, Rivington's "Royal Gazette," established in 1773, was a zealous supporter of the royal cause, and was discontinued soon after the peace of 1783. In 1797 was established the "Commercial Advertiser," now the oldest of New York newspapers. In 1800 the number of newspapers in the United States had increased to 200, of which several were dailies, the first daily having been the "Pennsylvania Packet, or the General Advertiser," called afterward the "Daily Advertiser," which continued to be issued daily from 1784 to 1837. In 1801 the "Evening Post" was founded by William Coleman, and William C. Bryant, William Leggett, and Parke Godwin have been its editors. The "National Intelligencer" was founded at Washington by Samuel Harrison Smith, and was first issued as a tri-weekly on Oct. 31, 1800. Joseph Gales became connected with it in 1807, and continued its editor till his death in 1860. In 1812 he took into partnership his brother-in-law, William W. Seaton, by whom the journal was edited till January, 1865. It was issued as a daily from January, 1813, to 1869, when it was discontinued. From 1800 to 1810 the number and circulation of American newspapers largely increased. By the census of 1810 the number of journals was 359, of which 27 were dailies, and the total annual issue was 22,321,000 copies. In 1824 there were 11 daily newspapers in Philadelphia and 12 in New York, with a circulation varying from 1,000 to 4,000 copies. In 1828 the whole number had increased to 852, with a yearly issue of 68,117,796 copies. In 1830 the number was estimated at 1,000. The census of 1840 returned 1,631 newspapers, with a yearly issue of 195,838,673 copies; in 1850 the number had reached 2,526 newspapers, with 5,142,177 circulation, and a yearly issue of 426,409,978 copies; in 1860, 4,501 newspapers, 13,663,409 circulation, yearly issue 927,951,548 copies; and in 1870, 5,871 newspapers, 20,842,475 circulation, yearly issue 1,508,548,250 copies. Rowell's "American Newspaper Directory" (New York) gives the following table showing the number of newspapers published in the United States and territories and British America in 1874:

STATES.	Daily.	Weekly.	STATES.	Daily.	Weekly.
Alabama.....	10	78	Oregon.....	4	33
Arkansas.....	4	55	Pennsylvania....	74	485
California.....	36	144	Rhode Island....	6	14
Connecticut.....	18	69	South Carolina...	5	60
Delaware.....	3	16	Tennessee.....	13	107
District of Co-			Texas.....	20	127
lumbia.....	5	12	Vermont.....	6	57
Florida.....		29	Virginia.....	18	80
Georgia.....	11	104	West Virginia....	7	56
Illinois.....	36	457	Wisconsin.....	13	194
Indiana.....	25	223			
Iowa.....	22	275		654	5,456
Kansas.....	14	136	Territories.....	24	98
Kentucky.....	8	101			
Louisiana.....	7	71	Total United		
Maine.....	9	53	States.....	673	5,554
Maryland.....	8	85			
Massachusetts...	26	212	BRITISH AMERICA.		
Michigan.....	21	230			
Minnesota.....	7	112	New Brunswick..	4	21
Mississippi.....	6	84	Nova Scotia.....	4	24
Missouri.....	24	234	Ontario.....	23	212
Nebraska.....	10	77	Quebec.....	12	41
Nevada.....	7	8	British colonies..	3	17
New Hampshire..	9	44			
New Jersey.....	20	132	Total British		
New York.....	98	681	America....	46	315
North Carolina..	10	80			
Ohio.....	29	356	Grand total....	724	5,869

About one seventh of the daily papers print tri-weekly or semi-weekly editions; nearly every daily issues a weekly; a few journals issue only semi- or tri-weekly editions; the weekly total includes religious, literary, agricultural and horticultural, technical and professional, illustrated, and miscellaneous papers.—In 1833 a “penny paper” called “The Sun” was established in New York by Benjamin H. Day, but it soon passed into the hands of Moses Y. Beach. It was at first about 10 inches square, and being sold for one cent, grew rapidly into a circulation of 60,000 copies. It was afterward enlarged, and its management and character having been changed in 1867, its circulation was greatly increased, the price being two cents. In 1835 James Gordon Bennett began the publication of the “New York Herald,” at first as a penny paper, but afterward raised the price to two cents, and subsequently to four cents. At his death it passed into the hands of his son, James Gordon Bennett, jr., by whom it is now conducted. On April 10, 1841, the “Tribune” was founded by Horace Greeley, and it was edited by him till his nomination for the presidency in 1872, when he was succeeded by White-law Reid. Politically it is now independent. The “New York Times” was established in 1850 by Henry J. Raymond. “The World” was established in June, 1860, as a religious daily, and in July, 1861, united with itself the “Courier and Enquirer.” In 1862 it was purchased by Manton Marble, who made it a democratic journal, and who still edits it. “The Graphic,” established in 1873, was the first attempt in this country to publish an illustrated daily paper. The “Herald,” “World,” and “Times” are published every day in the year, and their Sunday issues are sold at five cents. In 1849 the New York “Journal of

Commerce,” “Courier and Enquirer,” “Tribune,” “Herald,” “Sun,” and “Express” combined to form the “New York Associated Press,” of which the “Times” on its establishment in 1850 became a member; the “World” when founded in 1860 was made a participant in its news privileges, and in 1861 by absorbing the “Courier and Enquirer” became a member. The association collects and distributes to the newspapers the latest news by telegraph from all quarters, at an annual expense (in 1875) of about \$1,000,000. The New York “Evening Post,” “Commercial Advertiser,” and *Staats-Zeitung* buy their telegraphic news from the associated press, as also do the local associations known as the “New York State Associated Press,” the “Western Associated Press,” the “New England Associated Press,” and the “California Associated Press.” The “American Press Association,” organized in Boston in July, 1870, is independent. Some of the New York weekly papers, as “Harper’s Weekly,” “Frank Leslie’s Illustrated Newspaper,” and the “New York Ledger,” have an immense circulation, that of the last having at times exceeded 400,000 a week. A noteworthy one is the chief American sporting paper, “The Spirit of the Times,” founded by William T. Porter, Dec. 10, 1831, conducted by him for 25 years, and merged in the present journal of the same name, originally “Wilkes’ Spirit of the Times,” under the management (still continued) of George Wilkes. The religious newspapers, of which the earliest was the “Boston Recorder,” established in 1815, are weekly. The chief of these published in New York are the “Observer” and “Evangelist,” Presbyterian; “Independent,” Congregational; “Churchman,” Episcopal; “Christian Advocate,” Methodist; “Examiner,” Baptist; “Liberal Christian,” Unitarian; “Christian Intelligencer,” Reformed; “Christian Union,” Congregational; “Morning Star,” Freewill Baptist (chief office at Dover, N. H.); “Tablet,” Roman Catholic; “New Jerusalem Messenger,” Swedenborgian; and the “Jewish Messenger.” Many country publishers now purchase “auxiliary papers,” having one side filled with general matter, and print the other side for their respective localities. Newspapers in foreign languages were published in the United States in 1874 as follows: German, 310—58 in Pennsylvania, 50 in New York, 33 in Ohio, 25 in Wisconsin, 24 in Illinois, 16 in New Jersey, 15 in Indiana, 14 in Missouri, 11 in Iowa, 9 in California, 7 in Texas, 6 each in Kentucky, Michigan, and Minnesota, 4 each in Maryland, Kansas, and Nebraska, 2 each in Massachusetts, Connecticut, Virginia, Louisiana, and Colorado, and 1 each in Delaware, the District of Columbia, West Virginia, South Carolina, Georgia, Tennessee, Dakota, and Oregon; French, 28—18 in Louisiana, 5 in New York, 2 in Massachusetts, and 1 each in Rhode Island, Illinois, and California; Scandinavian, 19—8 in Illinois, 3 in Minnesota, 2 in New York, and 1 each in Iowa,

Wisconsin, Kansas, Nebraska, Utah, and California; Spanish, 16—7 in New York, 6 in New Mexico, and 3 in California; Dutch, 6—5 in Michigan and 1 in Iowa; Italian, 2—1 each in New York and California; Welsh, 4—3 in Pennsylvania and 1 in New York; Bohemian, 5—2 in Nebraska, and 1 each in Ohio, Iowa, and Wisconsin; Polish, 2—1 each in Illinois and Missouri. There is a Portuguese paper in New York, a Chinese in San Francisco, and a Cherokee at Tahlequah, Indian territory. (See PERIODICAL LITERATURE.)

NEWSTEAD ABBEY, the family seat of Lord Byron, situated on the verge of Sherwood forest, England, $8\frac{1}{2}$ m. W. of Nottingham. The building was originally a priory of black canons, founded in 1170 by Henry II., and at the dissolution of the monasteries was granted by Henry VIII. to Sir John Byron. It was then a fine specimen of the early Anglo-Gothic, unsurpassed in elegance of composition and deli-



Newstead Abbey.

cacy of execution, and "stood embosomed in a happy valley," the slopes of which were covered by the broad oaks of Sherwood forest. The new possessor converted a portion of the building into a dwelling; and his successors have altered, embellished, or added to it, until it presents a singular mingling of opposite styles of architecture. The fifth Lord Byron, great-uncle of the poet, pulled down a large part of the house, cut down extensive plantations, and did all he could to injure the estate, from some cause of irritation against his son and heir, who however died before him. In 1817 Byron parted with Newstead for £180,000 to Col. Thomas Wildman, an old schoolfellow, who carefully preserved whatever relics of the poet he found there, and spent more than £200,000 on the reparation of the property, which on his demise in 1859 was put up at auction, the reserved price being £180,000. As the highest bid was but £121,000, the

estate was bought in by Col. Wildman's representatives, and subsequently it came into the possession of William Frederick Webb, who now (1875) owns and occupies it.

NEWT. See TRITON.

NEW TESTAMENT. See BIBLE.

NEWTON, the name of counties in six of the United States. **I.** A central county of Georgia, bounded S. W. by South river, and intersected by Yellow and Ucofauhatchee rivers, all three uniting at its S. extremity to form the Ocmulgee; area, about 400 sq. m.; pop. in 1870, 14,615, of whom 6,014 were colored. It has an undulating surface and a soil very fertile near the streams. It is intersected by the Georgia railroad. The chief productions in 1870 were 38,414 bushels of wheat, 192,587 of Indian corn, 31,974 of oats, 23,455 of sweet potatoes, 5,770 bales of cotton, 5,871 lbs. of wool, 67,455 of butter, 9,887 of honey, and 1,512 gallons of molasses. There were 968

horses, 1,112 mules and asses, 1,936 milch cows, 489 working oxen, 2,293 other cattle, 3,602 sheep, and 7,704 swine; 2 manufactories of cotton yarn, 9 tanneries, and 4 saw mills. Capital, Covington. **II.** A central county of Mississippi, drained by the head branches of the Chickasawha river; area, about 625 sq. m.; pop. in 1870, 10,067, of whom 3,386 were colored. It is intersected by the Vicksburg and Meridian railroad. The chief productions in 1870 were 2,492 bushels of wheat, 201,704

of Indian corn, 7,205 of oats, 30,262 of sweet potatoes, 3,399 bales of cotton, 5,650 lbs. of wool, 42,030 of butter, and 1,311 gallons of molasses. There were 1,256 horses, 643 mules and asses, 2,737 milch cows, 1,238 working oxen, 3,763 other cattle, 4,205 sheep, and 12,920 swine. Capital, Decatur. **III.** A S. E. county of Texas, separated from Louisiana by the Sabine river and drained by its branches; area, 964 sq. m.; pop. in 1870, 2,187, of whom 831 were colored. The surface is undulating toward the south and somewhat hilly in the north. The soil of the bottom lands is highly productive, but much of the upland is poor and sandy. Timber is abundant. The chief productions in 1870 were 51,303 bushels of Indian corn, 11,890 of sweet potatoes, 1,001 bales of cotton, and 4,574 gallons of molasses. There were 556 horses, 1,370 milch cows, 6,208 other cattle, 1,456 sheep, and 4,331 swine. Capital, Newton. **IV.** A N. W. county of Ar

kansas, drained by the Buffalo fork of White river and its head branches; area, about 900 sq. m.; pop. in 1870, 4,374, of whom 9 were colored. It has a diversified surface, much of it still covered with forests, and a generally fertile soil. The chief productions in 1870 were 9,830 bushels of wheat, 169,825 of Indian corn, 13,645 lbs. of tobacco, 43,292 of butter, 14,019 of honey, and 3,472 gallons of sorghum molasses. There were 1,148 horses, 1,232 milch cows, 781 working oxen, 1,549 other cattle, 2,355 sheep, and 14,126 swine. Capital, Jasper. **V.** A N. W. county of Indiana, bordering on Illinois, bounded N. by the Kankakee river, and intersected in the S. by the Iroquois; area, about 400 sq. m.; pop. in 1870, 5,829. Beaver lake, a considerable body of water, is in the N. part. The surface is level, and in parts swampy. It is traversed by the Pittsburgh, Cincinnati, and St. Louis railroad. The chief productions in 1870 were 23,802 bushels of wheat, 142,096 of Indian corn, 111,333 of oats, 18,855 of potatoes, 8,456 lbs. of wool, 155,755 of butter, and 14,854 tons of hay. There were 2,814 horses, 2,362 milch cows, 6,987 other cattle, 3,320 sheep, and 4,995 swine. Capital, Kentland. **VI.** A S. W. county of Missouri, bordering on Kansas and the Indian territory, and drained by branches of the Grand or Neosho river; area, about 750 sq. m.; pop. in 1870, 12,821, of whom 350 were colored. It is intersected by the Atlantic and Pacific railroad. The chief productions in 1870 were 67,725 bushels of wheat, 359,945 of Indian corn, 81,045 of oats, 26,982 of Irish and 6,879 of sweet potatoes, 16,480 lbs. of tobacco, 10,387 of wool, 90,824 of butter, and 15,619 gallons of sorghum molasses. There were 3,134 horses, 2,496 milch cows, 894 working oxen, 4,072 other cattle, 6,511 sheep, and 16,077 swine; 5 flour mills, 6 saw mills, and 1 manufactory of pig lead. Capital, Neosho.

NEWTON, a city of Middlesex co., Massachusetts, on a curve of the Charles river, which bounds it N., W., and S., and on the Boston and Albany and the Boston, Hartford, and Erie railroads, 8 m. W. of Boston; pop. in 1840, 3,351; in 1850, 5,258; in 1860, 8,382; in 1870, 12,825; in 1875, estimated at 17,000. The surface is high and undulating, the scenery beautiful, and the situation healthy. The city is divided into six wards, and contains nine post villages, viz.: Auburndale, Chestnut Hill, Newton, Newton Centre, Newton Highlands, Newton Lower Falls, Newton Upper Falls, Newtonville, and West Newton. There are ten railroad stations. Near the centre of the city there is a cemetery, with a diversified surface partly improved, embracing 82 acres. Many of the residents do business in Boston, but considerable manufacturing is carried on in the city, the river furnishing extensive water power at the upper and lower falls. The principal articles produced are braid and cordage, boots and shoes, carriages, print cloths, dye stuffs, emery cloth, glue, hosiery, ornamental goods, photograph frames, ink, paper,

shoddy, soap, and rolling mill products. There are a national and a savings bank. The city is lighted with gas and has a fire department. The valuation of property in 1872 was \$24,256,854; in 1874, \$28,081,445; city debt at the close of 1874, \$387,000. At Newton Centre is the Newton theological institution, founded by the Baptists in 1826. The buildings occupy the summit of a hill commanding a fine view. The regular course is three years. Tuition and room rent are free. In 1873-'4 it had 5 resident professors, 1 other instructor, 72 students, and a library of 12,000 volumes. Lasell female seminary, at Auburndale, established in 1851, is beautifully situated, and embraces instruction in the English branches and a four years' classical course. In 1873-'4 it had 11 instructors and 42 students. The most important of the other educational institutions is the English and classical school at West Newton, established in 1854. The public schools embrace a high, a training, 8 grammar, and 8 primary schools, and have an average attendance of about 2,000 pupils. There are several libraries: the free library, with 8,500 volumes; the Athenæum library; the Newton Centre library, 1,500 volumes; and the Lower Falls library, 1,500 volumes. The city has two weekly newspapers, two asylums for male and female orphans and destitute children, and 25 churches, viz.: 4 Baptist, 7 Congregational, 3 Episcopal, 5 Methodist, 2 Roman Catholic, 1 Swedenborgian, 2 Unitarian, and 1 Universalist.—Newton was settled in 1630, and was incorporated as a town in 1679. A city charter was granted in 1873.

NEWTON, Alfred P. See supplement.

NEWTON, Charles Thomas, an English archæologist, born in Herefordshire in 1816. He graduated at Oxford in 1837, and from 1840 to 1852 was an assistant in the department of antiquities in the British museum. In 1856, while vice consul at Mytilene, he discovered at Boodroom (anc. Halicarnassus) the site of the Mausoleum. (See HALICARNASSUS.) He was engaged in other interesting excavations from 1856 to 1859, and enriched the British museum with numerous sculptures, inscriptions, vases, coins, and other relics. In 1860 he became consul at Rome, and in 1861 keeper of the Greek and Roman antiquities in the British museum. His wife, who was known as an artist, died Jan. 2, 1866.

NEWTON, Gilbert Stuart, an English painter, born in Halifax, Nova Scotia, Nov. 2, 1794, died in Chelsea, England, Aug. 3, 1835. On the death of his father he removed in 1803 with his mother to Boston, and was instructed in painting by his maternal uncle, Gilbert Stuart. About 1816 he went to Italy; and after studying a while at Florence and elsewhere, he went in 1817 to London and became a student in the royal academy. Here he formed an intimacy with Charles R. Leslie and Washington Irving. He early adopted a style founded on that of Watteau, and attracted

notice by his "Forsaken" and "Lovers' Quarrel," from Molière's *Dépôt amoureux*, which were engraved for the "Literary Souvenir" of 1826. Among his other works are "Shylock and Jessica," "Yorick and the Grisette," "The Abbot Boniface," "A Poet reading his Verses to an impatient Gallant," "Macheath," "Lear attended by Cordelia and the Physician," "The Vicar of Wakefield restoring Olivia to her Mother," and "Abélard in his Study," most of which have been engraved. He was elected a member of the academy in 1833. In 1832 he revisited the United States. Shortly after his return in 1833 he exhibited symptoms of mental aberration, and the last two years of his life were passed in a lunatic asylum.

NEWTON, Sir *Isaac*, an English philosopher, born at Woolthorpe, Lincolnshire, Dec. 25, 1642, died in Kensington, a suburb of London, March 20, 1727. He was a posthumous and only child, like Kepler, and was born prematurely. He was descended, according to his own account, from Sir John Newton of Westby in Lincolnshire, and according to another from a Scotch family in East Lothian. When he was three years of age, his mother, having married again, gave him to the charge of his maternal grandmother. He went to school at Skillington and Stoke till his 12th year, when he was sent to the free school at Grantham, six miles from his native hamlet, taught by a Mr. Stokes. He ranked low in his classes for some time, but being ill treated by the boy who stood next above him he determined to defeat his opponent in class work, and applied himself with such resolution to his books that he at length stood at the head of the whole school. He was usually less interested in the sports of his schoolmates than in constructing little mechanical contrivances, in which he showed marked facility of imitation and invention. He arranged a set of pins or gnomons upon the adjacent houses so as to mark the time of day by their shadows; the arrangement served as a sort of town clock, and was known as "Isaac's dial." On the outside wall of his house at Woolthorpe there is still a sun dial which he must have carved there. There were formerly two, but the stone on which the other was cut was removed in 1844 and presented to the royal society. In 1656 his mother, again a widow, took him to help in the management of the farm at Woolthorpe; but such was his passion for study that he found little time to look after the concerns of the farm. His mother sent him back to Grantham, where he was fitted to enter Trinity college, Cambridge, in 1661. It does not appear that he showed a marked preëminence in the studies of the university, but he extended his acquirements beyond the prescribed routine in several directions. In the winter of the year in which he was elected scholar (1664), or earlier, he invented his binomial theorem, to which he had been led by investigations into the problem of the quadrature of the circle,

and directed his attention to the subject of circles or halos around the moon, of which he gave the theory in his treatise on optics. In 1665 he took the degree of B. A., and probably in the same year invented fluxions.—At this period the thoughts of philosophers were strongly directed to the telescope. Huygens had constructed instruments which revealed the rings and satellites of Saturn. Descartes had explained the theory of refraction, and had pointed out how glasses could be ground of such a shape as to unite parallel rays of light in a focus. Still these glasses had the great defect of giving a confused image, which was thought to be owing to imperfect manufacture, and Newton applied himself to grinding them with more accuracy. But he also experimented with a ray of light, and soon came to the conclusion "that light was not homogeneous, but composed of rays, some of which were more refrangible than others." This showed him that the defect of the lens of the refracting telescope was inherent and not accidental. He accordingly abandoned his attempts to improve that instrument, and devoted himself to the construction of a reflecting telescope, which James Gregory of Aberdeen, in view of the defects of the refracting medium, had already invented. While Newton was engaged on this, the plague forced him to retire to Woolthorpe (1666), and it was more than two years before he resumed his researches. During his retreat at Woolthorpe (whether in this or the previous year is uncertain) he first conceived the identity of gravity with the force which holds the planets to their orbits, and made his first test calculations; but, starting with the erroneous estimate then entertained of the earth's mass, he failed to verify the happy conjecture (see *ASTRONOMY*); and it was not till about 1680 that he resumed work upon the problem. On the cessation of the plague he returned to Cambridge, was made junior fellow in October, 1667, and senior fellow in March, 1668, and graduated M. A. in July of the same year. In the autumn of 1668 he completed a reflecting telescope 6 in. in length, magnifying 40 times, which enabled him to see Jupiter's satellites and the phases of Venus. This was the first reflecting telescope ever directed to the heavens, for Gregory never completed the instrument which he had invented. Compared with the much earlier refractors of Hevelius and Huygens, however, this was a small and ill-made instrument. In the autumn of 1671 Newton made another, which was sent up in December "for his majesty's perusal." It is carefully preserved in the library of the royal society of London. His mind appears to have been much occupied at this time and for many years afterward with "chemical studies and practices." His celebrated letter (1669) of advice to Mr. Aston, who was about to set out for a tour of the continent, reveals a strong belief in the doctrines of alchemy; and he cer-

taily pursued his experiments to a late period of his life in the hope of effecting some valuable transmutations.—In 1669 he became Lucasian professor of mathematics at Cambridge, and during that and the next year spent considerable time in writing notes for a Latin translation of Kinckhuysen's algebra. In 1669–72 he delivered a course of lectures on optics in the university, and from time to time communicated to the royal society the results of his researches on light and colors. The new doctrine of the compound nature of light involved Newton in a long and acrimonious controversy both at home and abroad. Newton considered light to consist of material particles. Hooke believed it to result from a series of undulations of an elastic medium pervading all bodies. With this theory, which Huygens maintained in common with Hooke, Newton's alleged discovery seemed incompatible, and was accordingly strenuously resisted. On the other side Newton himself rejected Huygens's beautiful law of double refraction in Iceland spar, "founded on the finest experimental analysis of the phenomena," because it was presented as a corollary of the undulatory theory. Hooke in the one case, and Newton in the other, failed alike to see, or refused to admit, that the principle in question was true or false independently of what light is, or how it is propagated. It is remarkable that Newton should have missed, in the course of his optical experiments and the controversy which followed, the discovery of the different dispersive powers of different bodies. The opinion that all bodies produce spectra of equal length under the same angle of refraction, though "unsupported by experiments," observes Brewster, "and not even sustained by any theoretical views, seems to have been impressed upon his mind with all the force of an axiom; and when, under the influence of this blind conviction, he pronounced the improvement of the refracting telescope to be desperate, he checked for a long time the progress of this branch of science, and furnished to future philosophers a lesson which cannot be too deeply studied." From 1671 to 1676 his optical researches and the disputes in which they involved him seem to have occupied most of his time. He wrote to Leibnitz, Dec. 9, 1675: "I was so persecuted with discussions arising out of my theory of light, that I blamed my own imprudence for parting with so substantial a blessing as my quiet to run after a shadow." In January, 1672, he was elected fellow of the royal society; but he offered his resignation in March, 1673, on the ground of being unable to attend the meetings. An interesting document in Newton's handwriting, entitled "A Scheme for establishing the Royal Society," has been brought to light by Sir David Brewster. His desire, it seems, was to convert the royal society into an institution like the academy of sciences in Paris. On Dec. 9, 1675, he sent to the society his "Hypothesis

explaining the Properties of Light" (reprinted in the "Philosophical Magazine," September, 1846), and his "Explanation of the Colors of Thin Plates and of Natural Bodies," which Brewster says "is perhaps the loftiest of all his speculations." The phenomena of colors he ascribes to a supposed property of light, which he calls "fits of easy reflection and transmission." The theory is that every particle of light, from its first discharge from a luminous body, possesses, at equally distant intervals, dispositions to be reflected from and transmitted through the surfaces of bodies upon which it is incident. This appears to have been his last communication to the society on optical subjects. In 1704 he published his great work on optics; much of it was written as early as 1675, and most of the remainder about 1687.—In 1679 Newton's attention was recalled to the subject of universal gravitation by a letter from Hooke, who declared that "if gravity decreased according to the reciprocal of the square of the distance, the path of a projectile would be an ellipse having the centre of the earth in the focus." Newton had hitherto confined his researches to bodies revolving in circular orbits. He now demonstrated the mathematical necessity of the three laws of Kepler as applied to the motion of a body projected in free space, and acted upon continually by a force directed toward the focus and varying inversely as the square of the distance. Newton could not consider the law of gravitation established so long as the serious discrepancy found in his calculations upon the moon remained unaccounted for. In 1680, hearing of a new measurement of a degree of the meridian by Picard, the French astronomer, which differed materially from the commonly received estimate, he went over the calculation again on the basis of the new measure, and the result was in exact agreement with observation. He perceived that the earth, by its axial rotation and the mutual attraction of the particles of matter composing its mass, must be flattened at the poles, and he determined the amount of this flattening, though according to an incorrect law for the variation of the earth's density. He showed that the spheroidal figure of the earth, combined with its diurnal motion, would cause the weights of bodies at the surface to vary in different latitudes; and this result of pure theory explained a singular fact first noticed by the French astronomer Richer, who in 1672 had found that a clock regulated to mean time of Paris lost 2m. 28s. daily at Cayenne, within 5° of the equator. This led him to an explanation of the precession of the equinoxes. Kepler and others before him had spoken of an attraction of the waters of the earth by the moon. Newton explained the tides. He saw that the masses of the planetary bodies could be determined by observing the effects of their mutual attraction, and that from this cause their several motions would be disturbed. Thus he was conducted to an

elucidation of the intricate subject of the moon's motions, which had long been a stumbling-block to astronomers. He deduced theoretically the two lunar inequalities known as the variation and the annual equation, and also the progression of the apogee and the regression of the nodes, though it was reserved for the mathematicians of the next century to complete the lunar theory. It is not known that he made any public announcement of his discoveries before February, 1685, when he sent to the royal society a paper containing his early researches on centripetal forces. Halley, who had endeavored in 1684 to calculate the law of the solar force directed to the planets moving in elliptical orbits, consulted Newton, and, finding that he had gone over the whole ground, induced him to communicate to the royal society the paper already alluded to. On its presentation Hooke raised a violent reclamation relative to the asserted discovery of the law of gravitation. As early as 1666 he had arrived at very accurate notions of centripetal forces. He had published in 1674 "An Attempt to prove the Motion of Earth from Observations," in which, as Mr. Grant observes, he describes the general nature of gravity with remarkable clearness and accuracy. (There is a Latin translation of this work, printed in 1679.) But he had not attempted to compute the law of the variation of the force at different distances from the centre, which, as applied to the elliptical orbits of the planets, was the very problem which Newton had solved. The pretensions of Hooke called forth from Newton a long letter, dated June 20, 1686, in which he recounts the progress of his researches, and intimates his resolution to suppress the third book of his *Principia* rather than have his peace of mind disturbed by a controversy with envious rivals. By Halley's persuasion, however, Newton consented to let the whole appear. In April, 1686, the first book of the *Principia* was exhibited at the royal society; in June Halley undertook its publication at his own expense, although it involved him in considerable pecuniary risk; and it appeared the next year, bearing the following title page: *Philosophiæ Naturalis Principia Mathematica. Imprimatur Julii 5, 1686. Londini, 1687.* It is divided into three books. The first treats of motion in free space; the second treats chiefly of resisted motion; and the third deduces from these the system of the world. The doctrines of the *Principia*, like all discoveries which tend to overthrow cherished opinions, were hotly combated for many years. The philosophy of Descartes, which the Newtonian theories at length supplanted, was predominant throughout Europe; and Voltaire said that at the time of his death Newton had not more than 20 followers outside of England. "The language of the French mathematicians," observes the author of the "History of the Inductive Sciences," "is Cartesian for almost half a century after

the publication of the *Principia* of Newton." "The profound and intricate reasoning which Newton was compelled to adopt," says Mr. Grant, "formed a serious impediment to the early dissemination of his doctrines." The British universities, however, early introduced the Newtonian philosophy as a subject of study. The university of St. Andrews in Scotland took the lead in 1690, followed by Cambridge in 1699, and by Oxford in 1704. Dr. Bentley made the new principles the basis of a theological argument in the Boyle lectures preached in London in 1692-'3.—After the publication of the *Principia*, Newton was content to extend and develop the principles of his philosophy without advancing into any new fields of science; and even these developments appear to have been based for the most part on experiments and observations previously made. He was elected to represent the university in parliament in 1689, and again in 1701; and though he was rejected in 1705, those who opposed him acknowledged him to be "the glory of the university," but considered that he was sent to "tempt them from their duty by the great and just veneration they had for him." On the dissolution of parliament in 1690 he resumed his philosophical and mathematical studies at Cambridge. After this his health became impaired. In December, 1692, and January and February, 1693, he wrote the four celebrated letters to Dr. Bentley on the existence of a Deity. He was greatly affected about the beginning of 1692 by the loss of valuable manuscripts, which were consumed in his study by the upsetting of a candle. The notable story of his little dog Diamond having occasioned the mischief, and of Newton's remarkable equanimity on seeing what had happened, Brewster considers a fiction. In a letter to Pepys, dated Sept. 13, 1693, and one to Locke about the same time, there are evidences of loss of judgment. A fortnight after the former was written, Newton told a common friend "that he had writ a very odd letter to Pepys, at which he was much concerned;" adding "that it was in a distemper that much seized his head, and that kept him awake for above five nights together." Not many days after his painful letter to Locke was written he wrote again with child-like simplicity and tenderness, asking to be forgiven for thinking ill of him, and subscribing himself, "Your most humble and unfortunate servant." About this time began the celebrated quarrel between Newton and Flamsteed, the astronomer royal, which was only terminated by Flamsteed's death (1719). They had been on terms of cordial intimacy till 1696, when a coolness began to spring up. Newton was engaged on his lunar theory, and required observations of the moon's places. Flamsteed, who at his own expense had put himself in possession of the proper instruments, was the only one who could furnish the observations. They were supplied, though not as promptly as Newton

wished. Complaint followed, with little outbreaks of temper on both sides. Newton was at the summit of his fame, and Flamsteed saw the vast importance of his own labors, then unappreciated, but since fully allowed. Halley, devoted to Newton, embittered the difference. The quarrel culminated in the publication, under Halley's name, of Flamsteed's celestial observations, which Halley had mutilated. (See FLAMSTEED.) Newton received in 1695 the appointment of warden of the mint, worth between £500 and £600 a year; and in 1699 he was promoted to the mastership of the mint, worth £1,200 to £1,500, which office he held during the rest of his life. The chancellor of the exchequer declared that he could not have carried on the recoinage of 1699 without his assistance. On his promotion he appointed Mr. Whiston to be his deputy at Cambridge, with the full profits of the place; and in 1701 he resigned the chair. In 1699 he was elected foreign associate of the academy of sciences at Paris. He was chosen president of the royal society in 1703, and annually reelected during his life. In 1705 he was knighted by Queen Anne. In 1713 he communicated a paper to the royal society on the different kinds of years in use among the nations of antiquity; it was published in the "Gentleman's Magazine" for January, 1715, and the original is in the British museum. In 1717 he prepared two reports on the state of the coinage, which were laid before the houses of parliament. They were followed by a proclamation in December, 1717, reducing the value of guineas from 21*s.* 6*d.* to 21*s.*—In 1705 began the famous dispute with Leibnitz. Newton and Leibnitz, it is now clear, were both original inventors of the infinitesimal analysis, Newton being the earlier. But Leibnitz published his method in 1684, while Newton's did not appear till 1687. The geometry of the former spread rapidly over Europe; he was considered as the sole inventor, and Newton, in the first edition of the *Principia*, acknowledged his claims as an independent inventor. In 1699 a remark was dropped in the royal society casting suspicion upon the originality of Leibnitz's discovery. Leibnitz replied in the *Leipsic Journal* without asperity, asserting his claim. On Jan. 1, 1705, the same publication criticised with marked severity Newton's "Quadrature of Curves," then lately published, in which the method of fluxions was for the first time announced to the world, asserting in effect that the fluxionary method was not an original discovery. Newton and his friends were justly indignant, and Keill, an astronomer, undertook his defence, but was betrayed into doing similar injustice to Leibnitz, charging him in effect with having borrowed his calculus from hints thrown out by Newton. Leibnitz appealed to the royal society, which appointed a commission in the premises. Their report, which vindicates Newton's claims, forms what is called the *Commercium Epistolicum* (1712); for the con-

tents of which, as also of a second edition with a review entitled *Recensio* (1722), Newton was himself fully responsible. In a new edition, edited by MM. Biot and Lefort (4to, Paris, 1856), this report is shown to be in many points unfair. The dissension continued without abatement up to Leibnitz's death (1716). Newton published soon after what Biot characterizes as a "bitter refutation." In the first edition of the *Principia* (book ii., scholium to lemma 2) justice was done to Leibnitz's claim. In the third edition (1725) another scholium is substituted, in which Leibnitz's name is not mentioned.—During his residence at Cambridge Newton was in the habit, as he expresses it, "of refreshing himself with history and chronology when he was weary with other studies." Hence grew up a system of chronology, which however was very imperfect and only existed in separate papers till the princess of Wales (afterward queen consort of George II.), who enjoyed the privilege of his conversation during the latter part of his life, requested a copy of it for her private use. The manuscript after some years was printed in Paris (1725) surreptitiously, and involved Newton in an annoying controversy, in consequence of which he was induced to prepare a larger work, which was interrupted by his death. It appeared toward the end of 1727, under the title, "The Chronology of Ancient Kingdoms amended, to which is prefixed a Short Chronicle from the first Memory of Things in Europe to the Conquest of Persia by Alexander the Great." His system was based on the astronomical observations of the ancients.—Previous to 1692 Newton was known by the appellation of an "excellent divine." It is therefore probable that his posthumous papers on religious subjects were composed in the prime of life, at Cambridge. His "Observations on the Prophecies of Daniel and the Apocalypse of St. John" appeared in London in 1733 (4to). His "Historical Account of two Notable Corruptions of Scripture," mainly composed prior to 1690, but finished in that year, was first published in 1754, under the erroneous title of "Two Letters from Sir Isaac Newton to M. Le Clerc." In some catalogues of Newton's works another edition is mentioned, entitled "Two Letters to Mr. Clarke, late Divinity Professor of the Remonstrants in Holland" (1734). It appears to have been first published entire in Horsley's edition of Newton's works, under the title; "Historical Account of two Notable Corruptions of Scripture, in a Letter to a Friend." That friend was probably Locke. In this work he considers the two noted texts, 1 John v. 7, and 1 Tim. iii. 16. The former he attempts to prove spurious, and the latter he considers a false reading. The publication of several of his private papers in Sir David Brewster's memoir places the fact of his entertaining Arian opinions beyond question. About the beginning of 1691 Locke contemplated going to Holland,

and Newton sent him the above mentioned tract in strict confidence, requesting him to take it with him and procure its translation and publication in French, anonymously, as is evident; the object being apparently to ascertain the judgment of Biblical critics before bringing it out under his own name in English. Locke abandoned his intention of visiting Holland, but sent the manuscript to his friend Le Clerc in that country, who in January of the next year informed Locke that he was about to publish it in Latin. Newton, hearing of this, became alarmed at the risk of detection, and stopped the publication. He left many manuscripts on religious subjects, which have never been published. Besides a Latin dissertation on the sacred cubit of the Jews, printed in 1737 among the miscellaneous works of Mr. John Greaves, Newton's only other published religious writings are the four celebrated letters addressed to Dr. Bentley, first printed in 1756. They are directed against atheism, and aim to show that matter could never have arrayed itself in its present forms without a divine power being impressed upon it. Except a short tract on the nature of acids, his only chemical paper is one printed in the "Philosophical Transactions" for March and April, 1701, under the title of *Scala Graduum Caloris*. It contains a comparative scale of temperatures, from that of melting ice to that of a small kitchen coal fire. To the second English edition of the "Optics" are appended several queries, the 18th and 24th of which contain his opinions in favor of the existence of an elastic ether diffused through all space, "much subtler than air."—During the last 20 years of his life, which he spent in London, the charge of his domestic concerns, as he was never married, devolved upon his niece, Mrs. Catharine Conduitt. For two or three years prior to 1725 he had been troubled with a disorder of the bladder, accompanied with cough and gout. In January of that year he was seized with a violent cough and inflammation of the lungs, in consequence of which he removed his residence to Kensington, where his health improved. From this time the duties of his office at the mint were discharged by Mr. Conduitt. On Feb. 28, 1727, he went to London to preside at a meeting of the royal society, and became greatly fatigued. His old complaint returned with increased violence, and soon proved fatal. He was buried with great pomp in Westminster abbey, where a monument to him was erected in 1731. Though he had accumulated a personal estate worth at his death £32,000, he does not appear to have lived narrowly. He often evinced great generosity; to his relatives in particular he was lavish. He was of medium stature, and in the latter part of his life inclined to corpulency. In old age he had a fine head of hair, as white as silver, without any baldness. He never wore spectacles, and it is said he

never lost more than one tooth to the day of his death. The house in which Newton was born was purchased in 1858 by Miss Charlwood of Grantham, to be pulled down, that a scientific college might be erected on its site. His statue was inaugurated at Grantham, Sept. 21, 1858. His dwelling house, with an observatory which he built on the top, still remains in St. Martin's street, London, and is a place of scientific pilgrimage.—Besides the first edition of the *Principia* above noticed, a second was published at Cambridge in 1713, under the superintendence of Cotes, whose correspondence with Newton at the time has been published (London, 1850), under the editorship of Mr. Edleston. A third edition appeared in London in 1726 (4to), edited by Pemberton; a fourth in 1729 (2 vols. 8vo), Englished by Motte; and a fifth in 1730 (2 vols. 8vo). Several editions have been published on the continent, the most famous of which is the Jesuits' edition (4 vols. 4to, Geneva, 1739-'42), republished in Glasgow under the editorship of Wright (4 vols. 8vo, 1822). A Latin translation of the "Optics," by Dr. Clarke, appeared in 1706 (4to), for which Newton presented the translator with £500. Many other editions have been published. Of his "Universal Arithmetic" there are several editions, both English and continental. The "Optical Lectures" appeared in 1728; "Fluxions," with a commentary, in 1736. His principal works were collected by Bishop Horsley (5 vols. 4to, London, 1779-'85). His communications to the royal society are comprised in vols. vii. to xi. of the "Transactions."—See Sir David Brewster's "Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton" (2 vols., 1855; new ed., revised by W. T. Lynn, 1875).

NEWTON, John, an English clergyman, born in London, July 24, 1725, died there, Dec. 31, 1807. While a boy he accompanied his father, who was master of a ship, to the Mediterranean, and subsequently made several voyages. In his 19th year he was seized by a press gang and taken on board the Harwich man-of-war, where he was made a midshipman. While the ship lay at Plymouth he deserted, but was soon caught, flogged, degraded, and treated with such severity that he willingly exchanged into an African trader off Madeira. He left this ship at Sierra Leone, and hiring himself out as a laborer to a slave trader in the island of Benaoes, he remained there till 1747, when an English captain arrived at Sierra Leone, commissioned by his father to bring him back. Shortly afterward he commanded a Liverpool slave ship, was engaged in that business four years, and confesses that, during all the time he was in it, "he never had the least scruples as to its lawfulness." But growing disgusted with the occupation, he obtained in August, 1755, the situation of surveyor of the port of Liverpool. While in Africa he had studied Euclid; during his voyages had taught himself Latin; and he now devoted himself to acquiring Greek

and Hebrew. He engaged zealously in the religious movement originated by Wesley and Whitefield, and in 1758 applied to the archbishop of York for holy orders, but was refused on the ground of irregularity. In April, 1764, however, he was ordained by the bishop of Lincoln and appointed curate of Olney in Buckinghamshire, and shortly afterward published "An Authentic Narrative of some Remarkable and Interesting Particulars in the Life of the Rev. John Newton." At Olney he remained nearly 16 years, forming a close friendship with Cowper, in conjunction with whom he wrote the "Olney Hymns." In 1779 he was presented with the rectory of the united parishes of St. Mary Woolnoth and St. Mary Woolchurch Haw, Lombard street, London, where he remained till his death, preaching three times a week even when more than 80 years old. He was a Calvinist, and was a prominent leader in the so-called evangelical party in the church of England. Among his works are a volume of "Six Discourses" (1760); a series of "Letters on Religion" (1762), under the signatures of Omicron and Vigil; "Cardiphonia;" and a "Review of Ecclesiastical History" (1770), besides numerous sermons and tracts. A collected edition of his works was published in 1816 (6 vols. 8vo, London). His life was written by the Rev. Richard Cecil (London, 1808); and several of his letters to Cowper are published in Southey's edition of the life and works of that poet.

NEWTON, Robert, an English clergyman, born at Roxby, Yorkshire, Sept. 8, 1780, died April 30, 1854. With a limited education he began to preach in 1798, and in 1799 was received into the British conference. In 1803 he was appointed to Glasgow circuit, where he attended lectures in the university on theology and philosophy. While he received his appointments regularly from the conference, most of his time was spent in special labors in various parts of England and Scotland. His appointment to London in 1812 brought his extraordinary pulpit talents more prominently before the public, and he was employed with great success in advocating the cause of the British and foreign Bible society. He was also associated with Thomas Coke in promoting the cause of Christian missions. The demands for his labors throughout England, Scotland, and Ireland were extraordinary. During more than 50 years he probably travelled more continuously in the interests of the church than any other man of the century. He was four times elected president of the British conference, and for many years acted as its secretary. In 1839 he was sent as delegate of the British conference to the Methodist Episcopal church of the United States, and during this stay his marvellous eloquence attracted vast crowds.

NEWTON, Thomas, an English bishop, born in Lichfield, Jan. 1, 1704, died Feb. 14, 1782. He graduated at Trinity college, Cambridge,

took orders in 1729, received the curacy of St. George's, Hanover square, London, and afterward that of Grosvenor chapel, and in 1744 was presented by the earl of Bath to the rectory of St. Mary-le-Bow. He was chosen in 1747 lecturer of St. George's, Hanover square. In 1761 he became bishop of Bristol, and in 1768 dean of St. Paul's. In 1749-'52 he published the first critical edition of Milton's "Poetical Works" with variorum notes (3 vols. 4to). His "Dissertations on the Prophecies" (3 vols. 8vo, 1754-'8) became very popular, and were translated into German and Danish. A collected edition of his writings appeared in 1783 (3 vols. 4to, London).

NEW WESTMINSTER, a city and till 1867 the capital of British Columbia, on the N. bank of Fraser river, 15 m. above its mouth in the gulf of Georgia, and 65 m. N. N. E. of Victoria; lat. 49° 13' N., lon. 122° 53' W.; pop. about 2,000, including some Indians. It has a magnificent site, and an equable and delightful climate. In the river (here about a mile wide) are several islands, most of them inhabited. Within a few miles are extensive deposits of silver, which have not been worked. Steamers run to Yale, the head of navigation, 100 m. above, and there is a semi-weekly line to Victoria. Salmon fishing is the principal industry, five large establishments being engaged in it, and shipping annually large quantities of canned and barrelled salmon to all parts of the world. The principal buildings are the court house, council hall, post office, library, masonic and odd fellows' halls, and the penitentiary in course of erection. The Episcopal church has a fine peal of bells, and there are also a Presbyterian, a Roman Catholic, and two Wesleyan Methodist churches. The city has two common schools, a Catholic college for boys, a young ladies' school conducted by the sisters of St. Anne, a hospital, a savings bank, a telegraph office, and a semi-weekly newspaper.

NEW YEAR'S DAY, the first day of the year. Ancient and modern civilized peoples, while differing as to the day from which they reckoned the beginning of the civil year (see **YEAR**), have agreed in distinguishing it by special festivities. The Romans dedicated the day and the whole ensuing month to Janus, offered sacrifices to him on 12 altars, and were careful so to order their conduct on that day that every word and action should be a happy augury of the 12 months of the year. They exchanged kindly greetings and wishes, and sent to their kinsfolk, friends, and acquaintance presents called *strenæ*. These new year's presents became under the Cæsars such a source of personal profit to the sovereign, and so onerous to his subjects, that Claudius limited them by a decree. The first Christian emperors kept up the custom, though still accompanied by many idolatrous rites. The church condemned it, prohibited Christians from joining in the social celebration, and ended by making it a religious festival in memory of the circumcision of Christ.

The bestowal of gifts upon new year's day was not peculiar to the Romans. The druids distributed branches of the sacred mistletoe, cut with peculiar ceremonies, as new year's gifts among the people; and the Saxons of the north, according to Bishop Stillingfleet, observed the festival with feasting and sending gifts. Henry III. of England is said to have extorted new year's gifts, and Queen Elizabeth's wardrobe and jewelry were probably almost wholly supplied from these contributions. Dr. Drake says that, although the queen made returns to the new year's gifts in plate and other articles, she took care that the balance should be in her own favor. As late as 1692, as appears from the "Monthly Miscellany" for December of that year, the English nobility were accustomed, "every new year's tide," to "send to the king a purse with gold in it." In England the ringing in the new year from the belfries of churches is now the only open demonstration of joy at the recurrence of the anniversary. In the city of New York the day is made the occasion of social visits by gentlemen, a custom dating back to the settlement of the town by the Dutch; and the practice has become prevalent in many parts of the United States.—The Jews celebrate their new year's festival (*Rosh hashshannah*) at the beginning of the month of Tishri (September–October), the first of the civil year corresponding to the seventh of the Mosaic or ecclesiastical. The distinguishing feature of the celebration in the synagogues is the blowing of horns, in accordance with Leviticus xxiii. 24. Among the Chinese the new year's celebration, continued for three days, is the greatest festival of the year. Preparatory to it, all accounts are settled and debts paid so far as possible; and tradesmen who cannot pay their debts are generally obliged to give up all their property to their creditors. On new year's day calls are made upon friends, joyous greetings are exchanged in the streets, paper prayers are offered in the temples, fireworks are burned, gongs are beaten, and a general hubbub prevails. At night gambling is practised to an enormous extent.

NEW YORK, one of the thirteen original states of the American Union, and one of the middle states, situated between lat. 40° 29' 40" and 45° 0' 42" N., and lon. 71° 51' and 79° 45' 54" W.; extreme length E. and W., 412 m.; breadth varying from 8 or 10 m. on Long island, and 18½ m. at the W. extremity of the state, to 31½ m. from the Canada boundary to the S. point of Staten island; area, 47,000 sq. m. It is bounded N. and N. W. by Lake Ontario and the St. Lawrence river, and again N. by Canada along the parallel of 45° from the St. Lawrence to the head of Lake Champlain; E. by Vermont (separated in part by Lake Champlain), Massachusetts, Connecticut, and the Atlantic ocean; S. by the Atlantic, New Jersey, and Pennsylvania; and W. by Pennsylvania, Lake Erie, and the Niagara river. It is divided into 60 counties, viz.: Albany, Allegany,

Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, and Yates. Albany, the capital, is on the W. bank of the Hudson river, about 140 m. N. of New York city; pop. in 1870, within its present limits, 76,216. The population of New York city in 1870 was 942,292, but recent annexations have increased it, according to the census of that year, to 973,773; its total population in 1874 was about 1,050,000. The other cities of the state, with the number of inhabitants as reported by the federal census of 1870, are: Auburn, 17,225; Binghamton, 12,692; Brooklyn, 396,099; Buffalo, 117,714; Cohoes, 15,357; Elmira, 15,863; Hudson, 8,615; Kingston (1874), about 22,000; Lockport, 12,426; Long Island City (1874), about 16,000; Newburgh, 17,014; Ogdensburg, 10,076; Oswego, 20,910; Poughkeepsie, 20,080; Rochester, 62,386; Rome, 11,000; Schenectady, 11,026; Syracuse, 43,051; Troy, 46,465; Utica, 28,804; Watertown, 9,336; Yonkers (1874), about 16,000.—In population New York surpasses every other state in the Union. Under the colonial government, the number of inhabitants in 1698 was 18,067; 1703, 20,665; 1723, 40,564; 1731, 50,824; 1737, 60,437; 1746, 61,589; 1749, 73,348; 1756, 96,790; 1771, 163,337. The results of the United States decennial censuses have been as follows:

YEARS.	White.	Free colored.	Slave.	Total.	Rank.
1790.....	314,142	4,654	21,324	340,120	5
1800.....	557,731	10,417	20,903	589,051	3
1810.....	918,699	25,333	15,017	959,049	2
1820.....	1,392,744	29,279	10,088	1,372,111	1
1830.....	1,873,663	44,870	75	1,918,608	1
1840.....	2,378,890	50,027	4	2,428,921	1
1850.....	3,048,325	49,069	.....	3,097,394	1
1860.....	3,831,590	49,005	.....	3,880,735	1
1870.....	4,380,210	52,051	.....	4,382,759	1

Included in the total of 1860 were 140 Indians, and in that of 1870, 439 Indians and 29 Chinese. Censuses have also been taken by the state as follows: 1814 (total population), 1,035,910; 1825, 1,614,456; 1835, 2,174,517; 1845, 2,604,495; 1855, 3,466,212; 1865, 3,831,777. The population increased from 1698 to 1771, or during a colonial period of 73 years, 804.06 per cent., or at the rate of 11.014 per annum. The increase from 1790 to 1850, or during a period of 60 years, was 810.67 per cent., or 13.51 per annum; 1840 to 1850, 27.52 per cent., or 2.75 per annum; 1850 to 1855, 11.91 per cent., or 2.38 per annum; 1855 to 1860,

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11.12 per cent., or 2.22 per annum; 1860 to 1865, 12.61 per cent., or 2.52 per annum; 1865 to 1870, 13 per cent., or 2.6 per annum. Of the total population in 1870, 2,163,229 were males and 2,219,530 females; 3,244,406 were native and 1,138,353 foreign born. Of the natives, 2,987,779 were born in the state, 38,851 in Connecticut, 5,985 in Maine, 41,355 in Massachusetts, 4,850 in Michigan, 9,211 in New Hampshire, 32,408 in New Jersey, 36,170 in Pennsylvania, 6,993 in Rhode Island, 36,307 in Vermont, and 7,070 in Virginia and West Virginia. Of the foreigners, 79,042 were born in British America, 110,071 in England, 528,806 in Ireland, 27,282 in Scotland, 7,857 in Wales, 22,302 in France, 316,902 in Germany, 6,426 in Holland, 5,522 in Sweden, 4,061 in Poland, 3,592 in Italy, 818 in Spain, 1,824 in Cuba, and 7,916 in Switzerland. The density of population was 93.25 persons to a square mile. There were 898,772 families, with an average of 4.88 persons to

there were engaged in all occupations 1,491,018, of whom 1,233,979 were males and 257,039 females; in agriculture, 374,323, of whom 134,562 were laborers and 232,649 farmers and planters; in professional and personal services, 405,339, including 5,678 clergymen, 155,150 domestic servants, 931 journalists, 139,309 laborers not specified, 5,913 lawyers, 6,810 physicians and surgeons, and 18,557 teachers not specified; in trade and transportation, 234,581; and in manufactures and mechanical and mining industries, 476,775, of whom 19,291 were blacksmiths, 24,309 boot and shoe makers, 53,046 carpenters and joiners, 11,413 machinists, 16,594 masons, 26,540 milliners and dress and mantua makers, 18,082 painters and varnishers, 10,193 printers, 3,431 ship carpenters, 41,627 tailors, tailoresses, and seamstresses, 11,368 curriers, tanners, and finishers of leather, and 6,869 woollen mill operatives. The total number of deaths during the year was 69,095, being 1.58 per cent. of the entire population. Chief among the causes of mortality were consumption, from which 11,578 persons died, pneumonia, 5,262, and cholera infantum, 3,577; there were 6 deaths from all causes to 1 from consumption, and 13.1 to 1 from pneumonia. There were 1,134 deaths from croup, 1,073 from measles, 582 from smallpox, 864 from diphtheria, 3,403 from scarlet fever, 2,029 from enteric fever, 2,243 from diarrhoea, 1,068 from dysentery, and 1,330 from enteritis. Not included in the census are 5,140 Indians of the Six Nations in New York, on eight reservations, mainly in the extreme S. W. part of the state, of whom 3,060 were Senecas, and the others Saint Regis, Onondagas, Tuscaroras, Oneidas, and Cayugas. They have adopted a civilized life, are intelligent and industrious, and are chiefly engaged in agriculture; 30 schools and an orphan asylum are maintained by the state for their benefit.—The outlines of the state are very irregular, only about one third of the entire boundaries consisting of straight lines. The river, lake, and ocean boundaries are all navigable waters, except 17½ m. on Poughkeepsie river, and consist of 352 m. on Lakes Erie, Ontario, and Champlain, 281 m. on the St. Lawrence, Poughkeepsie, Hudson, Kill van Kull, Delaware, and Niagara rivers, and 246 m. on Long Island sound and the Atlantic ocean; total, 879. The land boundaries along Canada, Vermont, Massachusetts, Connecticut, New Jersey, and Pennsylvania, all made up of straight lines, form a total of 541.28 m. The principal islands belonging to the state are the following: in Niagara river, Grand, Squaw, Strawberry, Rattlesnake, Tonawanda, Beaver, Buckhorn, Cayuga, and Goat; in the St. Lawrence, Carlton, Grenadier, Fox, Wells, Grindstone, a large number of the Thousand islands, and Gallup; in Lake Champlain, Valcour, Crab, and Schuyler; in New York bay, the Atlantic ocean, and Long Island sound, Manhattan, Staten, Long, Gardiner's, Shelter, Plum, Fisher's, all the islands between Long



Seal of the State of New York

each, and 688,559 dwellings, with an average of 6.37 to each, the latter average being larger in New York than in any other state. The number of persons from 5 to 18 years of age was 1,220,988; from 18 to 45, 881,500; male citizens 21 years old and upward, 981,587. There were 163,501 persons 10 years old and over who could not read, and 239,271 unable to write, of whom 70,702 were native and 168,569 foreign born. Of persons 21 years of age and upward, 73,208 white males and 116,744 white females, and 3,912 colored males and 4,874 colored females, were illiterate. The number of paupers supported during the year ending June 1, 1870, was 26,152, at a cost of \$2,661,385; of the total number receiving support at that date (14,100), 5,953 were native and 8,147 foreign born. During the year 5,473 persons were convicted of crime; of the total number (4,704) in prison June 1, 1870, 2,658 were natives and 2,046 foreigners. The state contained 2,213 blind, 1,783 deaf and dumb, 6,353 insane, and 2,486 idiotic. Of the total population 10 years old and over (3,378,959),

island and Connecticut to within a few rods of the Connecticut shore, Hart's, Randall's, Ward's, Blackwell's, Governor's, Bedloe's, and Ellis. The last three are owned by the general government, and occupied as military posts. New York bay and harbor is deep and capacious enough to accommodate all the shipping belonging to and trading with the port of New York. The other principal harbors are Dunkirk and Buffalo, on Lake Erie; Tonawanda and Lewiston, on Niagara river; Genesee, Sodus, Oswego, Sackett's Harbor, and Cape Vincent, on Lake Ontario; Ogdensburg, on the St. Lawrence; Rouse's Point, Plattsburgh, Port Henry, and Whitehall, on Lake Champlain; and Sag Harbor, at the E. end of Long island. The principal river of the state is the Hudson, which is navigable to Troy, 151 m. from its mouth. The Mohawk, the principal affluent of the Hudson, rising in the interior, enters the Hudson at Waterford, descending about 500 ft. in its entire length of 135 m.; it affords extensive water power at Little Falls and Cohoes. Its principal branches are West and East Canada creeks from the north, and Schoharie creek from the south. Oswego river, which receives the waters of all the interior lakes, from Oneida and Cazenovia on the east to Keuka (formerly Crooked) and Canandaigua on the west, furnishes with its branches and tributaries good water power at Penn Yan, on Keuka lake outlet; at Waterloo, Seneca Falls, and Baldwinsville, on Seneca river; at Phelps, on Flint creek and Canandaigua outlet; at Auburn, on Owasco outlet; almost the entire length of Skaneateles outlet (the fall being 453 ft. in 9 m.); at Cazenovia and Chittenango, on Chittenango creek; and at Fulton and Oswego, on Oswego river. The Alleghany, Susquehanna, and Delaware, with numerous branches, drain the western, central, and eastern portions respectively of the S. part of the state, and furnish valuable water power at numerous points. Cattaraugus and Tonawanda creeks are also considerable streams in the west, the former furnishing important water power, and the latter affording slack-water navigation for the Erie canal for about 10 m. from its mouth. The other principal streams are Buffalo river (formerly creek), flowing into Lake Erie; Oak Orchard creek, Genesee, Salmon, and Black rivers, flowing into Lake Ontario; Oswegatchie, Grasse, and Raquette rivers, tributaries of the St. Lawrence; Chazy, Saranac, and Au Sable rivers, and Wood creek, rapid streams or mountain torrents flowing into Lake Champlain, and furnishing almost unlimited water power; Susquehanna river, which rises in Otsego lake, and in its course in the state receives the waters of Charlotte, Unadilla, and Chenango rivers; and Chemung river, which drains a portion of the state between the Alleghany and Susquehanna, and receives the waters of Canisteo, Conhocton, and Tioga rivers. The principal branches of the Delaware are Popacton and

Nevisink rivers.—The state is noted for the great number of beautiful lakes in the interior and N. E. parts. The principal of these are Chautauqua and Cattaraugus, in the west; Hemlock, Honeoye, Canadice, and Conesus, in the Genesee basin, which discharge their waters into Genesee river; Canandaigua, Keuka, Seneca, Cayuga, Owasco, Skaneateles, Cross, Onondaga, Otisco, Cazenovia, and Oneida, in the central part of the state, all of which find an outlet for their waters through Oswego river; Otsego and Schuyler, which empty into the Susquehanna; and George, Schroon, Au Sable, Placid, Avalanche, Colden, Henderson, Sandford, Blue Mountain, the Fulton lakes (eight in number), Raquette, Beach's, Forked, Newcomb, Long, Cranberry, Upper Saranac, Lower Saranac, Tupper's, Chateaugay, Chazy, Rich, Pleasant, Peseco, Smith's, Moose, and numerous smaller lakes, in the N. E. part. Canandaigua, Keuka, Seneca, Cayuga, Owasco, Onondaga, Skaneateles, Chautauqua, Otsego, and Oneida lakes, and Lake George, are all navigable for boats and steamers, and on many of them considerable trade is carried on. Lakes Erie, Ontario, and Champlain are navigable for vessels of all sizes. Seneca lake never freezes, and steamers ply upon it throughout the year. The scenery of these lakes attracts thousands of pleasure seekers during the summer months.—The surface of the state is greatly diversified. The topographical features are clearly marked in the mountain ranges and great extent of certain outcrops forming escarpments which extend across the state E. and W. The range constituting the Highlands on the Hudson, entering the state from New Jersey, extends N. E. through Rockland, Orange, Putnam, and Dutchess cos. It is composed of compact gneissoid and granitic rocks. The highest points, varying from 1,100 to 1,700 ft., are Butter hill, Crow's Nest, and Bear mountain in Orange co.; Bull hill, Anthony's Nose, and Breakneck mountain in Putnam co.; and Beacon hill in Dutchess co. This range in its proper limitation gradually declines northeastward to Dover Plains, and passes in low hills into Litchfield co., Conn. It has been sometimes regarded as a continuation of the Blue Ridge of Virginia, but the connection is not proved, and its geological relation is distinct from the metamorphic formations on either side. The Adirondack range is of the same age as the Highlands, and of the same geological structure. This range begins in the Mohawk valley, and is seen on both sides of it at the Noses, rising on the south 100 ft. above the level of the river, and again at Little Falls, forming the rapids. It extends over the N. part of Montgomery and Herkimer cos., the N. E. part of Oneida, all of Lewis co. E. of the Black river, a considerable part of Saratoga, the most of Warren, Hamilton co. entire, nearly all of Essex, Clinton, and Franklin, the greater part of St. Lawrence, and much of Jefferson. The whole constitutes "that

comparatively immense and beautifully circumscribed nucleus, which from a height [in Essex co.] of nearly 6,000 ft. descends with great irregularity, and disappears under the transition rocks which encircle it, and which border the St. Lawrence, the Champlain, the Mohawk, and the Black river." Under the patronage of the state, Mr. Verplanck Colvin has been for several years engaged in a topographical and trigonometrical survey of some portions of this region, and his reports for 1873 and 1874 present many new facts. The position and altitude of many mountains and lakes have been determined by him, and the heights of well known peaks more accurately measured, giving to Mt. Marcy and Mt. McIntyre 5,402 and 5,201 ft. respectively. Gothic mountain and Basin mountain, nearly 5,000 ft. in height, are among those now for the first time determined. Mts. Dix, Seward, and Santanoni are reduced by Mr. Colvin's measurements to 4,916, 4,384, and 4,644 ft. respectively. He reports the existence in this region of the moose and beaver, though rare and nearly extinct. The bear, panther, and wolf are still common, and are trapped for their fur or for state bounty. The common deer are plentiful in some sections. A commission of state parks appointed by the legislature have reported in favor of setting apart as a state park from 600 to 3,000 sq. m. of the high mountain region of the Adirondacks, embracing Mt. Marcy and all the great peaks; the chief objects being to preserve the forests for their beneficial climatic effects, moderating the spring freshets in the Hudson by sheltering the snow from the heat of the sun, shielding the sources of this river from evaporation, and affording a healthful pleasure ground. The continuation of the Appalachian range proper in New York is seen in the Shawangunk and Catskill mountains; the former a continuation of the Kittatinny and Blue mountains of Pennsylvania, the latter of the Alleghany, Broad Top, Laurel Hill, and others. This range, entering the state from the southwest, extends northeasterly through Sullivan, Ulster, Delaware, and Greene cos., culminating in the Catskills about 8 m. from the Hudson river. Several minor ridges pass through the W. part of Delaware, Broome, Otsego, and Chenango cos., extending into the S. part of Schoharie, and forming a part of the Catskill mountain range. Along the eastern boundary of the state is a less defined but continuous low mountain range belonging to the same system, entering the state from New Jersey W. of the Highlands, there forming Skunemunk mountain, and extending thence through Dutchess, Columbia, Rensselaer, and Washington cos., known as the Taghkanic range. It is usually regarded as subordinate to the Green mountain range. Its highest points are Beacon hill and Mt. Washington in Dutchess co. The Helderberg mountains are a northern extension of the formations constituting the base of the Catskill mountains. These present a steep escarpment

on the north and northeast, over the Helderberg limestones and Hudson river formation, while the higher rounded summits are of the Hamilton group. This escarpment continues more or less distinctly to the Niagara river. Spurs of the Alleghanies occupy the S. part of the western half of the state. The watershed separating the northern and southern drainage of western New York extends in an irregular line through the southerly counties. That portion of the state S. of this watershed, and embracing the greater part of the two southerly tiers of counties, is almost entirely hilly. The highest summits W. of the Susquehanna are in Allegany and Cattaraugus cos., and are 2,000 to 2,500 ft. above tide. N. of the watershed the face of the country descends in a series of rolling and smooth terraces toward Lake Ontario, the region between the hills of the south and the level lands of the north being a beautiful rolling country. S. of the Highlands the surface is generally level or broken by low hills. The river system consists of two general divisions, viz.: that part drained by the great lakes and the St. Lawrence, northerly; and that part drained by the Hudson and other rivers, southerly. The watershed between these two divisions extends in an irregular line from Lake Erie eastward through the southern tier of counties to near the N. E. corner of Chemung co., thence N. E. to the Adirondack mountains in Essex co., thence S. E. to the E. extremity of Lake George, and thence nearly due E. to the E. line of the state. The northern of these divisions consists of five subdivisions or basins, viz.: the basin drained by Lake Erie, Niagara river, and Lake Ontario W. of Genesee river; that of Genesee river and its tributaries; of Oswego river and its tributaries, and the small streams flowing into Lake Ontario between Genesee and Oswego rivers; of the St. Lawrence and the streams flowing into Lake Ontario E. of Oswego river; and that drained by Lakes George and Champlain. The southern division consists of four subdivisions, viz.: the Alleghany, the Susquehanna, the Delaware, and the Hudson river basins.—The geological series within the state of New York is very complete, from the oldest palæozoic rocks to the lower members of the carboniferous system inclusive. This series was described by the New York geologists as the New York system. The Adirondack region, N. of the Mohawk and E. of the Black river, comprises the most ancient highly crystalline rocks, known as the Laurentian system; the lower portions are gneissoid and granitic, and the higher consist of labradorite and hypersthene, forming a coarse granitic mass. Extensive beds of magnetite traverse the strata parallel to the bedding, yielding immense quantities of the ore. The hypersthene rock forms the great mountain centre of which Mts. Marcy and McIntyre are the culminations. In St. Lawrence and Jefferson cos. the prevailing rocks are coarse granite, crystalline limestone, and serpentine,

containing vast beds of specular iron ore. These rocks are doubtfully of Laurentian age, but their relations to other formations have not been determined. The crystalline rocks of this entire area are regularly stratified, and were formed anterior to the Potsdam sandstone, which lies against and upon their upturned and eroded edges. The Highlands on the Hudson are of the same age as the Adirondacks, and also contain heavy beds of magnetite. The gneissoid and mica slate formation, which comes into the state from the south and passes eastward of the Highlands, is of more recent age, and contains no magnetite. In New York the Potsdam sandstone succeeds the Laurentian, and appears in a broad, continuous belt along the N. and N. W. slopes of the Adirondacks, and in interrupted outliers on the east, from Clinton to Saratoga co. Overlying the Potsdam, the calciferous sandstone is coextensive with it in the north, and extends further S. The Taghkanic range, including shales, sandstones, and limestones, often more or less metamorphic, with beds of hematite, white and variegated marbles, roofing slate, &c., must be considered of the same age as the Potsdam and calciferous sandstones and Chazy limestone of Lake Champlain. The Trenton group, including Birdseye, Black river, and Trenton limestones, occupies much of Jefferson co., and, continuing S. E. through Lewis and Oneida cos., is seen at Trenton falls and in the Mohawk valley; thence eastward and northward it encircles at least two thirds of the great Laurentian district. The Utica slate and Hudson river group, extending from near Rondout, form a belt on both sides of the Hudson to the bend at Sandy Hill; following the course of the Mohawk valley as far as Rome, it diverges N. W. through Lewis and Oswego cos. to Lake Ontario. The Shawangunk grit or conglomerate, containing lead and copper ores, extends from the Delaware river to Rondout, where it suddenly terminates, and is not again seen *in situ*, except in Oneida co., where it is known as the Oneida conglomerate. The gray sandstone of Oswego holds essentially the same position, and boulders and pebbles of similar conglomerate have been there found upon the surface. Southward from the outcrop of the Hudson river group, the Medina sandstone and Clinton group come in; the thin edge of the latter, beginning in Schoharie co., trends westward, and extends on both sides of Oneida lake, and thence with the sandstone forms a broad belt along the S. shore of Lake Ontario. The beds of fossiliferous iron ore of the Clinton group are extensively worked in Oneida and Wayne cos., and extend as far W. as Monroe. The limestone of the Niagara group produces the falls of the Niagara and the great escarpment of Lewiston and Queenston, which, beginning as a terrace in Schoharie co., extends through the state and western Canada. Co-extensive with this formation are the water-lime and salt groups; of small force in eastern

New York, they expand in the central part of the state. The salt group is the source of all the productive brine springs and wells, and also of the gypsum. The waterlime group furnishes nearly all the hydraulic cement. Entering the state from the N. W. corner of New Jersey, and occupying the valley W. of the Shawangunk mountain, a series of strata of no great prominence reach the Hudson at Rondout, trend northward in a low terrace everywhere marked by a limestone crest, and extend into Albany co. Here thickening and expanding, they constitute the Helderberg formations, separated into upper and lower by the Oriskany sandstone; these, surmounted by the Hamilton rocks, form the Helderberg mountains. The Hamilton group enters the state from the south at Deer Park, approaches the Hudson at Kingston, and thence following the base of the Catskills turns westward, expanding to a width of several miles, and becoming a highly fossiliferous group. The higher beds furnish the flagstones which are extensively quarried and supplied to all the seaboard cities and towns of the north. The thicker beds are known as the Hudson river blue stone. The Portage and Chemung groups, the former marked by dark shales and flaggy sandstones, the latter by olive shales and heavy-bedded sandstones, form a broad belt, entering the state from Pennsylvania on the Delaware river; thence, skirting the base and forming a considerable portion of the lower part of the Catskill mountains, they sweep around them to the north and occupy the valleys between them. From the Chenango river west these formations cover almost the entire width of the two southern ranges of counties, and outcrop on Lake Erie from Eighteen-mile creek to the Pennsylvania line. The Catskill or old red sandstone formation enters the state on the south in several belts, trending N. E. The more westerly of these soon die out, but the three easterly ones continue into Greene co., and uniting form the Catskill mountains. These belts, which are synclinals, carry also outliers of the succeeding formation, the lowest sandstones of the carboniferous system, forming considerable areas on the higher summits of the Catskills and further south. Beyond these lower carboniferous beds the geological series in direct succession is not continued within the state of New York. The red sandstone of the middle secondary, or trias, extends from N. E. New Jersey over a part of Rockland co., terminating at the Palisades on the Hudson and at Haverstraw bay. The cretaceous formation is known on Long Island. The more recent formations are the post-pliocene of the Champlain valley, and the glacial or water-worn drift which to a great extent overspreads the older formations. The mineral springs of Saratoga and Ballston rise from a line of fault which brings the Hudson river slates against the calciferous sandstone and limestones above. The sulphur springs of Sharon, &c., rise from the upper part of the

Onondaga salt group. In western New York the sandstones are bituminous, and in several of the counties petroleum issues with the water of springs; and carburetted hydrogen rises from fissures in the rocks, or through standing or running water. The rock formations from the Potsdam sandstone up, which have been named, with their various subdivisions, constitute what is called the New York system, and with the carboniferous group complete the Appalachian system. Though the whole series is found in Pennsylvania, the formations below the carboniferous are more fully developed in New York, and are especially richer in fossils. In this state therefore they have been studied to the best advantage, and when recognized in other parts of the country are generally known by the names given to them by the New York geologists. (See GEOLOGY, and PALEONTOLOGY.) Many of the groups are in great part made up of limestones, and even among the shales and slates of the others calcareous strata are of frequent occurrence. The effect of this wide distribution of calcareous matter has been to insure a general fertility of soil, and to give to New York a high position among the agricultural states of the Union.—Somewhat more than half of the total area of the state is under cultivation. In the northern counties and the highland regions along the S. border and on the Hudson, stock and sheep raising and dairy farming are the almost exclusive agricultural pursuits; while the low lands that form the greater part of the surface of the W. portion of the state are best adapted to grain growing. Broom corn has long been the staple crop of the Mohawk valley intervals; tobacco is extensively raised in the Chemung valley, and parts of Onondaga and Wayne cos.; hops are a leading product of Madison, Oneida, Otsego, and Schoharie cos.; grapes are successfully cultivated in the valley of the Hudson below the Highlands, on the N. shore of Long island, and in all the lake valleys in the central part of the state. Maple sugar is an important product of the northern and central portions; and fruits, particularly apples, peaches, pears, and strawberries, are grown in the western counties N. of the watershed. Large tracts in the vicinity of New York city are devoted to market gardens and to furnishing the city with milk.—The climate possesses a wider range than that of any other state in the Union. Those portions affected by the winds from the ocean, sound, and lakes are more even in temperature and suffer less severely from late and early frosts than more inland districts in the same latitude. The mean temperature of the state, as determined from observations made at 58 meteorological stations, for periods ranging from 1 to 25 years, is 46.49°. The mean length of the season of vegetation, from the first blooming of apples to the first killing frost, is 174 days; while on Long island it is 12½ days longer, and in St. Lawrence co. 22 days shorter. The

mean annual fall of rain and snow is about 40.93 inches.—The most noted waterfalls in the state are Niagara falls in Niagara river, 2,900 ft. wide and 164 ft. high; the falls of Genesee river (see GENESSEE RIVER); Trenton falls, in West Canada creek, Herkimer co., consisting of five cascades with a total fall of 200 ft. in ¾ m.; Taghanic falls, Tompkins co., 230 ft.; Chittenango falls in Chittenango creek, Madison co., 136 ft.; Lyon's falls, in Black river, Lewis co., flowing down an inclined plane 63 ft. at an angle of 60°; Kaaterskill falls, Greene co., consisting of two falls, 180 and 80 ft.; Bash-bish falls, Columbia co. (partly in Massachusetts), a succession of falls in a deep ravine, the total fall in 1 m. being about 700 ft.; Baker's falls, Washington co., a succession of falls and rapids, having a total descent of 76 ft. in 60 rods; Cohoes fall in the Mohawk, near its mouth, with a total fall including rapids of 103 ft.; Glen's falls, Warren co., 50 ft.; High falls, in the Hudson, Warren co., 60 ft.; High falls, Ulster co., 50 ft.; the Au Sable falls, in Wilmington, Essex co., 100 ft.; Enfield falls, Tompkins co., consisting of a series of cascades with a total fall of 230 ft.; Buttermilk falls, Genesee co., 90 ft.; and the falls in Fall creek, Tompkins co., consisting of five cascades with a total descent of over 500 ft. in 1 m. Watkins glen, near the head of Seneca lake, is a deep and narrow ravine about 3 m. long, having perpendicular walls in some places 200 ft. high. Its annual visitors number more than 50,000. Havana glen, 3½ m. distant, is similar to it. Within a radius of 10 m. from Ithaca are numerous picturesque ravines and waterfalls. Upon Stone Bridge creek, Warren co., is a natural bridge 40 ft. high, 80 ft. broad, and 247 ft. long. The principal mineral and medicinal springs are the salt springs of Onondaga co.; Saratoga Springs; New Lebanon and Stockport, Columbia co.; Massena, St. Lawrence co.; Richfield, Otsego co.; Avon, Livingston co.; Clifton, Ontario co.; Sharon, Schoharie co.; Chittenango, Madison co.; and Alabama, Genesee co. The "Lake ridge," the shore line of the ancient lake, is a beach-like ridge from 4 to 8 m. S. of Lake Ontario and rising from 5 to 20 ft. above the general surface, extending from near the Niagara river to Sodus, Wayne co.; thence with many interruptions its line may be traced to the St. Lawrence near its point of egress from the lake.—In many respects New York is the leading agricultural state of the Union. According to the census of 1870, the area of farm lands was greater than in any other state except Illinois; they were valued at upward of \$118,000,000 more than those of any other state, and yielded during the year nearly \$43,000,000 more. In several of the western and southern states the yield of wheat and Indian corn was greater, but New York produced more than a fifth of all the hay raised in the United States, more than a third of the buckwheat, and 17,558,681 lbs. of the entire growth (25,456,669 lbs.) of

hops. The state ranked first in the production of peas, beans, and potatoes, as well as in the value of the produce of market gardens, orchards, and forests; next to Ohio in flax, Pennsylvania in rye, California in barley, Vermont in maple sugar, Illinois and Pennsylvania in oats, and Ohio and California in the amount of wool and the number of sheep. In dairy products the prominence of New York is specially marked. In 1870 there were on farms 8,935,332 milch cows in the United States, of which 1,350,661 were in New York. The dairy products of the whole country were 514,092,683 lbs. of butter, 53,492,153 of cheese, and 235,500,599 gallons of milk sold; of New York, 107,147,526 lbs. of butter, 22,769,964 of cheese, and 135,775,919 gallons of milk sold. The factories of the United States produced 109,435,229 lbs. of cheese, valued with other products at \$16,771,665, of which 78,006,048 lbs., valued at \$12,164,065, were the product of New York. The great dairy counties of the state are St. Lawrence, Delaware, Chenango, Chautauqua, Jefferson, and Orange. In 1870 there were on farms 15,627,206 acres of improved land, 5,679,870 of woodland, and 883,734 of other unimproved land. The number of farms was 216,253, averaging 103 acres; 13,006 contained from 3 to 10 acres each, 18,145 from 10 to 20, 54,881 from 20 to 50, 73,956 from 50 to 100, 55,948 from 100 to 500, 209 from 500 to 1,000, and 36 over 1,000. The cash value of farms was \$1,272,857,776; farming implements and machinery, \$45,997,712; total amount of wages paid during the year, including value of board, \$34,451,362. The agricultural productions of New York in 1873, and the number and value of live stock on farms Jan. 1, 1874, as reported by the U. S. department of agriculture, were as follows:

PRODUCTIONS AND LIVE STOCK.	Quantity and number.	Average yield per acre.	Number of acres in crop.	Total valuation.
Indian corn, bushels	17,692,000	81	570,710	\$12,384,400
Wheat..... "	7,047,000	13.5	522,000	11,275,200
Rye..... "	1,858,000	14	182,857	1,598,580
Oats..... "	27,548,000	81	888,645	11,345,640
Barley..... "	5,576,000	21.2	277,170	6,468,600
Buckwheat. "	2,947,000	19.7	149,594	2,269,190
Potatoes ... "	24,925,000	103	241,990	18,459,500
Tobacco, pounds...	2,950,000	1,000	2,950	824,500
Hay, tons.....	4,199,800	1.02	4,117,451	75,596,400
Horses.....number	659,800	....	....	62,732,895
Mules..... "	15,900	....	....	2,328,102
Oxen and other cattle..... "	688,600	....	....	19,742,363
Milch cows..... "	1,410,600	....	....	43,023,800
Sheep..... "	2,037,200	....	....	6,544,992
Hogs..... "	651,500	....	....	5,036,095

In 1870 the total estimated value of all farm productions, including betterments and additions to stock, was \$253,526,153; products of orchards, \$8,347,417; of market gardens, \$3,432,354; of forests, \$6,689,179; of home manufactures, \$1,621,621; of animals slaughtered or sold for slaughter, \$28,225,720. The productions were 1,834,330 bushels of spring and 10,344,132 of winter wheat, 2,478,125 of rye, 16,462,825 of

Indian corn, 35,293,625 of oats, 7,434,621 of barley, 3,904,030 of buckwheat, 1,152,541 of peas and beans, 28,547,593 of Irish and 10,656 of sweet potatoes, 98,837 of clover and 57,225 of grass seed, 92,519 of flax seed, 5,614,205 tons of hay, 2,349,793 lbs. of tobacco, 10,599,225 of wool, 3,670,818 of flax, 6,692,040 of maple sugar, 896,286 of honey, 86,333 of wax, 82,607 gallons of wine, and 7,832 of sorghum and 46,048 of maple molasses. There were on farms 536,861 horses, 4,407 mules and asses, 1,350,661 milch cows, 64,141 working oxen, 630,522 other cattle, 2,181,578 sheep, and 518,251 swine. The value of live stock was \$175,882,712. There were 319,380 horses and 40,906 neat cattle not on farms.—According to the census of 1870, more than a sixth of all the capital invested in manufactures in the United States was employed in New York, and more than a sixth of the value of the entire products of the country was the result of New York industry. In the state ranking next, Pennsylvania, nearly \$40,000,000 more capital was invested than in New York, but the products of the latter state were valued at upward of \$72,000,000 more than those of the former. The capital has increased from \$99,904,405 in 1850 to \$172,895,652 in 1860 and \$366,994,320 in 1870; and the total value of products from \$237,597,249 in 1850 to \$378,870,939 in 1860 and \$785,194,651 in 1870. In the last named year, the total number of establishments was 36,206, using 4,664 steam engines of 126,107 horse power, and 9,011 water wheels of 208,256 horse power, and employing 351,800 hands, of whom 267,378 were males above 16, 63,795 females above 15, and 20,627 youth. The materials used amounted to \$452,065,452; wages paid, \$142,466,758. Not included in the above results for 1870 are the statistics of mining and quarrying, in which industries 5,177 hands were employed, \$4,696,091 capital invested, and \$4,324,651 worth of products obtained, including 525,493 tons of iron ore valued at \$2,095,315, and \$1,832,976 worth of stone; and those of fisheries, in which the products amounted to \$235,750. The most extensive iron mines are in Essex, Dutchess, Clinton, and Orange cos. The greater portion of the stone was quarried in Ulster co., though a large amount of marble was produced in Westchester co. In the following table of the leading industries a comparison is afforded between the values in New York and in the United States of those products in which the former ranks above all other states. In several other important industries, New York holds a very high but not the first rank. Thus, taking the value of products as a standard, the state ranks next to Massachusetts in the production of boots and shoes and paper, to Connecticut in hardware, to Illinois in planed lumber, to Ohio in agricultural implements, and to Pennsylvania in brick, carpets other than rag, drugs and chemicals, iron manufactures, and machinery.

INDUSTRIES.	No. of establish- ments.	No. of hands employed.	Capital.	Wages.	Value of materials.	Value of products.	Products of the United States.
Agricultural implements	337	4,953	\$7,824,656	\$2,518,317	\$4,594,316	\$11,547,087	.....
Bags, other than paper	8	408	358,000	149,766	1,482,303	2,002,288	.....
Blacksmithing	3,146	6,643	2,878,453	1,381,846	1,575,728	5,873,671	.....
Bleaching and dyeing	29	898	482,050	195,002	2,550,250	2,938,345	.....
Bookbinding	94	2,261	1,685,078	968,648	2,961,396	4,557,119	\$14,077,809
Boots and shoes	3,024	17,501	6,856,957	6,215,063	10,692,075	22,679,874	.....
Boxes, packing	107	1,121	764,950	580,812	978,778	2,127,953	8,222,433
" paper	718	1,691	437,950	532,222	671,463	1,709,907	8,917,159
Bakery products	710	8,457	2,673,142	1,448,312	5,616,322	9,566,153	36,907,704
Brick	320	6,728	3,416,280	1,856,424	1,265,299	4,483,202	.....
Brooms and whisk brushes	133	3,026	1,084,385	670,238	1,651,991	8,185,723	6,622,285
Carpentering and building	1,568	8,806	3,765,690	4,441,118	8,026,184	17,806,232	.....
Carpets, other than rag	13	8,425	4,251,750	1,423,784	3,046,868	4,976,885	.....
Carriages and wagons	1,797	8,784	6,281,140	3,667,747	8,831,757	11,049,345	65,302,337
Clothing, men's	1,546	28,793	14,782,043	8,826,008	27,982,394	46,375,369	147,650,373
" women's	446	4,700	1,266,434	1,078,893	2,810,074	4,880,425	12,900,565
Coal oil, rectified	19	183	699,500	109,607	2,236,149	2,702,680	.....
Coffee and spices, roasted and ground	29	309	1,513,600	211,095	3,105,260	4,706,200	11,266,423
Confectionery	157	1,398	1,377,700	489,514	1,820,988	3,942,391	15,922,643
Cooperage	870	4,932	2,223,366	1,369,083	2,555,920	4,945,434	.....
Cotton goods, not specified	67	8,909	8,209,236	2,560,731	6,711,378	10,740,961	.....
Drugs and chemicals	57	1,046	2,299,700	510,285	2,227,248	4,578,857	.....
Flouring and grist-mill products	1,610	5,193	20,956,820	1,687,294	50,606,044	60,237,220	444,985,143
Furniture, not specified	804	7,970	7,523,825	4,002,548	5,206,179	13,715,187	57,626,547
" chairs	106	1,583	1,284,338	737,849	824,478	2,360,181	.....
Furs, dressed	72	2,029	2,183,917	823,714	3,828,297	7,028,488	8,908,052
Gas	71	2,240	13,951,570	1,785,911	3,498,750	8,512,706	32,048,851
Gloves and mittens	144	3,112	2,071,350	848,484	1,668,998	3,807,795	8,998,521
Grease and tallow	16	110	201,500	47,320	2,683,055	3,816,207	.....
Hardware	113	1,811	1,980,385	815,871	988,435	2,484,787	.....
Hats and caps	135	5,267	2,363,083	2,188,110	4,218,353	8,708,723	24,848,167
Hoop skirts and corsets	46	2,480	1,079,000	615,334	1,349,367	2,866,619	4,758,290
Hosiery	60	3,741	3,813,700	1,122,890	3,891,840	5,528,742	18,411,564
India-rubber and elastic goods	10	1,008	1,777,000	489,500	1,316,808	8,076,720	.....
Instruments, professional and scientific	43	450	480,528	268,779	149,539	617,388	.....
Iron, blooms	22	1,020	1,614,838	358,135	1,626,264	2,171,166	.....
" forged and rolled	47	5,503	6,143,700	2,841,147	11,489,147	16,884,480	.....
" pigs	39	2,121	5,732,116	1,095,450	5,648,925	7,922,463	.....
" castings, not specified	422	8,769	9,372,113	5,024,413	8,205,735	17,252,226	76,458,553
" stoves, heaters, and	63	3,753	5,749,383	2,400,716	2,244,394	6,741,210	23,839,667

In Onondaga co. are the most extensive salt works in the United States. They are owned	and managed by the state, which derived from this source in 1873 a net revenue of \$15,180.
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The works in operation have an annual productive capacity of 10,700,000 bushels; 7,450,-257 bushels were inspected in 1873, and 6,594,-191 in 1874. (See SALT.)—For commercial purposes the state is divided into the following ten United States customs districts, of which the ports of entry bear the same name unless otherwise specified: Buffalo Creek, Cape Vincent, Champlain (port of entry Plattsburgh), Dunkirk, Genesee (Rochester), New York, Niagara (Suspension Bridge), Oswegatchie (Ogdensburg), Oswego, and Sag Harbor. In the district of New York, Albany, Esopus, Hudson, Kinderhook, Newburgh, New Windsor, Port Jefferson, Poughkeepsie, Rhinebeck Landing, and Troy are ports of delivery. The imports and exports for the year ending June 30, 1874, were as follows:

DISTRICTS.	Imports.	Domestic exports.	Foreign exports.
Buffalo Creek.....	\$2,916,406	\$460,473	\$53,949
Cape Vincent.....	524,480	118,110	.....
Champlain.....	2,176,784	1,041,154	34,957
Dunkirk.....	8,623	.....	.....
Genesee.....	429,472	367,527	38
New York.....	395,133,622	340,360,269	14,633,463
Niagara.....	4,579,846	351,078	65,731
Oswegatchie.....	1,977,751	605,233	136,264
Oswego.....	7,200,952	1,724,651	187
Sag Harbor.....	.....	.....	.....

The movement of foreign shipping in the various districts, and the number of vessels registered, enrolled, and licensed, were as follows:

DISTRICTS.	ENTERED.		CLEARED.		REGIST'D, & C.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
Buffalo Crk	730	241,456	704	224,130	805	163,829-08
Cape Vinc't.	753	106,217	736	102,886	34	3,996-28
Champlain ..	1,707	136,870	1,798	145,612	849	53,263-09
Dunkirk ...	18	1,258	15	957	8	896-55
Genesee.....	614	67,945	550	91,577	240	30,429-51
New York ..	6,723	5,049,618	6,103	4,837,218	6,630	1,318,523-34
Niagara.....	219	45,220	215	44,827	39	6,527-01
Osweg'tchie	434	88,380	434	88,856	35	3,635-65
Oswego.....	2,613	433,855	2,463	373,015	952	112,159-38
Sag Harbor..	.....	.....	.....	.....	231	13,236-22

The entrances and clearances in the coastwise trade, and the vessels built in the various districts, were as follows:

DISTRICTS.	COASTWISE TRADE.				Vessels built.	
	ENTERED.		CLEARED.			
	Vessels.	Tons.	Vessels.	Tons.	No.	Tons.
Buffalo Creek...	4,011	2,068,486	4,155	2,082,163	53	6,374
Cape Vincent....	180	23,263	207	23,070	4	1,129
Champlain.....	2	140	993	68,089	47	4,704
Dunkirk.....	71	13,306	76	13,551	..	..
Genesee.....	197	20,934	202	22,504	41	4,987
New York.....	2,742	1,774,181	4,081	2,175,412	396	64,001
Niagara.....	133	42,750	139	42,991	14	1,900
Oswegatchie....	620	176,957	620	177,897	8	876
Oswego.....	744	132,049	1,279	223,163	57	8,217
Sag Harbor.....	24	5,334	25	5,452	7	385

Details of the commerce of the port of New York are given in the article on that city. The only district in which vessels were reported to be engaged in the fisheries was that of Sag

Harbor, where in 1873 128 were employed in the cod and mackerel fisheries and 1 in the whale fishery; 7 vessels entered and 9 cleared in the general fisheries. Within the past few years the state commissioners of fisheries have taken measures to stock the internal waters of the state with varieties of edible fish. A state hatching house is maintained at Caledonia, Livingston co., and there is an extensive shad nursery in the Hudson, about 10 m. below Albany.—The first railroad in New York, the Mohawk and Hudson (from Albany to Schenectady), 17 m. long, was opened in 1831. In the following year the Saratoga and Schenectady, 21 m., and one mile of the New York and Harlem, were opened. The mileage of the state had increased to 719 m. in 1845, 2,444 in 1855, 2,769 in 1865, 3,829 in 1870, 4,927 in 1873, and 5,178 in 1874. There are stringent laws concerning the formation and continuance of railroad corporations, and strict regulations as to the protection of passengers. Each corporation is required to make an annual report under oath to the state engineer and surveyor, giving details as to the condition and transactions of the company; and this officer reports annually to the legislature. The chief items relating to all the corporations in the state in 1874 are shown in the following statement, in which the figures, except the mileage specified for New York, are not limited to the state, but apply to the entire corporations:

Miles of entire main line and branches.....	8,552
" of double track and sidings.....	8,956
Total track mileage.....	12,508
Miles main line and branches exclusive of second tracks and sidings completed in New York.....	5,178
Capital stock authorized.....	\$611,298,570
" paid in.....	\$202,365,070
Funded debt.....	\$201,681,017
Floating ".....	\$30,801,657
Total stock and debt.....	\$232,847,735
Cost of construction and equipment.....	\$598,543,330
Total annual expenses.....	\$66,087,974
Total annual earnings.....	\$97,951,073
Net annual earnings.....	\$31,868,099

The two most extensive railroad corporations of the state are the Erie and the New York Central and Hudson River. The former, chartered in 1832, was opened from Piermont to Goshen in 1841, to Binghamton in 1848, to Elmira in 1849, to Corning in 1850, and to Dunkirk in 1851. The eastern terminus was subsequently extended to Jersey City. More than 1,000 m. of railroad are operated by this company, whose earnings in 1873 exceeded \$20,000,000. The New York Central and Hudson River railroad is a consolidation of numerous lines. It was completed from Albany to Buffalo in 1841, and from New York to Albany in 1851. About 860 m. of road are owned and leased by the company; the total earnings in 1873 were about \$29,000,000. The following table exhibits the names of the lines lying wholly or partly within the state, together with the termini, the number of miles in operation within the state Jan. 1, 1875, and the paid-in capital stock and cost of construction and equipment for the entire lines:

NAMES OF CORPORATIONS.	TERMINI.		Miles completed in the state in 1874.	Total length between terminus when different from preceding.	Capital stock paid in.	Cost of construction and equipment.
	From	To				
Adirondack	Saratoga Springs...	Ogdensburg.....	60	185		\$2,728,692
Albany and Susquehanna.....	Albany.....	Binghamton.....	142	...	\$5,000,000	10,685,221
Branches:						
Cherry Valley, Sharon, and Albany	Cobleskill	Cherry Valley.....	21	...	281,350	600,000
Lackawanna and Susquehanna.....	Nineveh	Jefferson Junction.	21	...		1,012,792
Schenectady and Duaneburgh.....	Schenectady	Quaker Street Junction.....	15	...	91,300	600,000
Atlantic and Great Western.....	Salamanca.....	Dayton, O.....	48	387	84,671,543	51,245,071
Black River and St. Lawrence.....	Carthage	Edwards.....	12	38	144,988	144,422
Boston and Albany.....	Boston, Mass.....	Albany.....	39	201	19,864,100	27,788,686
Branch, Hudson and Boston.....	Chatham.....	Hudson.....	17	...		245,048
Brooklyn, Bath, and Coney Island.....	Brooklyn.....	Coney Island.....	7	...		
Buffalo, Corry, and Pittsburgh.....	Brocton.....	Corry, Pa.....	37	43		1,546,930
Buffalo and Jamestown.....	Buffalo	Jamestown.....	30	87	555,880	253,886
Buffalo, New York, and Philadelphia.....	Buffalo	Emporium, Pa.....	78	121	1,691,150	5,690,747
Cayuga.....	Ithaca.....	Cayuga.....	38	...	300,000	1,442,495
Cayuga and Susquehanna.....	Owego.....	Cayuga Lake.....	35	...	589,110	1,183,012
Cazenovia, Canastota, and De Ruyter.....	Canastota	De Ruyter.....	15	29	614,083	743,884
Chemung and Elmira, Jefferson and Canandaigua.....	Elmira.....	Canandaigua.....	69	...	880,000	2,177,384
Cooperstown and Susquehanna Valley.....	Cooperstown.....	Cooperstown Junction.....	16	...	308,405	459,283
Corning, Cowanesque, and Antrim.....	Corning.....	Antrim, Pa.....	16	53	1,900,000	1,900,000
Elmira and Williamsport.....	Erie Junction.....	Williamsport, Pa.....	6	76		
Erie.....	Jersey City, N. J.....	Dunkirk.....	386	459	86,536,910	115,075,900
Branches and lines leased:						
Avon, Genesee, and Mount Morris.	Avon.....	Mount Morris	15	...	194,250	217,812
Buffalo, Bradford, and Pittsburgh.	Carrollton.....	Gilesville, Pa.....	8	26		
Buffalo, New York, and Erie.....	Corning.....	Buffalo	141	...	950,000	3,280,000
Buffalo Branch.....	Hornellsville.....	Attica.....	60	...		
Erie and Genesee Valley.....	Mount Morris.....	Dansville.....	14	21	144,900	191,202
Goshen and Deckertown.....	Goshen.....	Pine Island.....	12	...	105,800	291,700
Middleburg and Schoharie.....	Middleburg.....	Schoharie.....	6	...	88,800	105,000
Montgomery and Erie.....	Goshen.....	Montgomery.....	10	...	150,065	288,930
Monticello and Port Jervis.....	Monticello.....	Port Jervis.....	24	...	420,207	1,050,853
Newburgh Branch.....	Greycourt.....	Newburgh.....	19	...		
Newburgh and New York.....	Newburgh Junction	Vail's Gate.....	13	...		
Northern Railroad of New Jersey.	Bergen, N. J.....	Nyack.....	6	26	1,000,000	327,451
Piermont Branch.....	Piermont.....	Suffern.....	18	...		
Rochester and Genesee Valley.....	Rochester.....	Avon.....	18	...	557,560	671,303
Suspension Bridge and Erie Junction.....	East Buffalo	Suspension Bridge.....	23	...	500,000	
Flushing, North Side, and Central.....	Long Island City...	Northport	55	76	593,000	
Fonda, Johnstown, and Gloversville.....	Fonda.....	Gloversville.....	10	...	800,000	511,988
Geneva, Ithaca, and Athens.....	Geneva.....	Pa. state line.....	75	...	950,600	2,465,814
Glen's Falls.....	Fort Edward.....	Glen's Falls.....	6	...	96,639	
Greene.....	Chemango Forks.....	Greene.....	8	...	200,000	394,913
Greenwich and Johnsonville.....	Greenwich.....	Johnsonville.....	14	...	130,845	810,792
Lake Champlain and Moriah.....	Port Henry.....	Mineville.....	7	...	200,000	442,637
Lake Ontario Shore.....	Oswego.....	Lewiston	51	148	1,873,502	4,002,917
Lake Shore and Michigan Southern.....	Buffalo	Chicago, Ill.....	69	540	50,000,000	79,682,758
Long Island.....	Hunter's Point.....	Greenport	94	...	3,300,000	5,281,902
Leased: New York and Rockaway.	Jamaica.....	Far Rockaway.....	10	...		350,000
Smithtown and Port Jefferson.....	Northport	Port Jefferson.....	19	...	96,227	565,456
Branches.....	East New York.....	Jamaica.....	5	...		
	Mineola.....	Roslyn	9	...		
	Hicksville.....	Northport	15	...		
	Manor Junction.....	Sag Harbor.....	35	...		
New York and Canada.....	Whitehall.....	Canada line.....	114	...		2,011,201
New York and Oswego Midland.....	Oswego.....	Middletown.....	149	...	6,500,522	26,043,892
Western Division.....	Norwich.....	Buffalo	283	185		
Branches.....	Guilford.....	New Berlin.....	22	...		
	Walton.....	Delhi.....	17	...		
	Summitville.....	Ellenville.....	7	...		
Leased: Middletown and Crawford.	Middletown.....	Crawford.....	10	...	124,187	192,000
Middletown, Unionville, and Water Gap.....	Middletown.....	N. J. state line.....	13	...	123,200	350,476
Rome and Clinton.....	Rome.....	Clinton.....	13	...	273,700	860,000
Utica, Clinton, and Binghamton.....	Utica.....	Smith's Valley.....	31	...		
New York, Boston, and Montreal.....	New York.....	Rutland, Vt.....	146	244	8,800,000	17,286,474
New York Central and Hudson River, main line.....	New York.....	Albany	144	...	89,428,300	92,506,508
	Albany	Buffalo	298	...		
	Schenectady Junction	Athens	40	...		
	Troy.....	Schenectady.....	21	...		
	Syracuse	Rochester.....	104	...		
	Batavia.....	Attica.....	11	...		
	Rochester	Niagara Falls.....	75	...		
	Rochester Junction.	Charlotte	7	...		
	Buffalo	Lewiston.....	28	...		
	Lockport Junction.	Tonawanda.....	12	...		

NAMES OF CORPORATIONS.	TERMINI.		Miles completed in the state in 1874.	Total length between termini when different from preceding.	Capital stock paid in.	Cost of construction and equipment.
	From	To				
Leased: Spuyten Duyvil and Port Morris.....	Mott Haven Junction.	Spuyten Duyvil....	6	...	\$989,000	\$980,549
New York and Mahopac.....	Golden's Bridge....	Lake Mahopac.....	7	...	265,000	265,448
Troy and Greenbush.....	Troy.....	Greenbush.....	6	...	274,400	294,900
Niagara Bridge and Canandaigua Junction.....	Canandaigua.....	Suspension Bridge.	98	...	1,000,600	8,495,832
Dunkirk, Allegheny Valley, and Pittsburgh.....	East Buffalo.....	International Bridge	8	...	214,600	214,600
New York and Harlem.....	Dunkirk.....	Oil City, Pa.....	42	106	1,800,000	4,782,843
New York, Kingston, and Syracuse..	New York.....	Chatham Four Corners.....	181	...	9,000,000	20,451,999
New York, New Haven, and Hartford.	Rondout.....	Stamford.....	75	...	...	3,245,921
Leased: Harlem River and Portchester.....	Harlem Junction...	Springfield, Mass...	15	123	15,500,000	15,498,184
Ogdensburg and Lake Champlain.....	Harlem River.....	New Rochelle.....	11	...	41,860	2,512,087
Oswego and Syracuse.....	Rouse's Point.....	Ogdensburg.....	118	...	5,077,000	5,796,920
Poughkeepsie and Eastern.....	Oswego.....	Syracuse.....	35	...	1,320,400	1,574,784
Rensselaer and Saratoga.....	Poughkeepsie....	Conn. state line....	47	...	524,468	1,475,480
Branches.....	Troy.....	Rutland, Vt.....	79	95	6,000,000	8,749,755
	Eagle Bridge.....	Castleton, Vt.....	44	61	...	...
	Ballston.....	Schenectady.....	21	...	...	...
	Fort Edward.....	Glen's Falls.....	6	...	...	...
	Watertown Junction.	Albany.....	12	...	...	...
	Rhinebeck.....	Boston Corners.....	23	88	118,795	610,585
	Rochester.....	Bishop Summit, Pa.	20	150	625,000	863,900
	Rochester and Pine Creek.....	Caledonia.....	6	26	120,127	186,477
	Rochester and State line.....	Rochester.....	24	107	27,084	1,248,896
	Rome, Watertown, and Ogdensburg..	Rome.....	141	...	8,147,500	4,810,648
Branches.....	Watertown.....	Cape Vincent.....	24	...	...	...
	De Kalb Junction..	Potsdam Junction..	24	...	...	...
	Richland.....	Oswego.....	29	...	300,000	950,952
	Schoharie C. H.....	Central Bridge.....	5	...	800,000	950,952
	Skaneateles.....	Junction.....	5	...	100,000	125,611
	Sodus Point and Southern.....	Stanley.....	33	...	715,966	1,588,799
	Southern Central.....	Fair Haven.....	116	...	1,784,771	4,211,770
	South Side.....	Williamsburgh.....	54	...	1,000,000	4,581,783
	Valley Stream.....	Rockaway Beach...	6	...	...	...
	Valley Stream.....	Hempstead.....	9	...	...	...
Branches.....	Vanderbilt Landing.	Tottenville.....	13	...	210,000	400,000
	Sterling Mountain.....	Lakeville.....	7	...	80,000	500,190
	Syracuse, Binghamton, and New York	Geddes.....	81	...	2,004,000	4,044,029
	Syracuse and Chenango.....	Syracuse.....	43	...	699,700	1,247,085
	Syracuse Northern.....	Sandy Creek Junction.....	45	...	1,005,043	1,985,658
	Troy and Boston.....	Troy.....	35	...	1,609,010	2,447,043
	Leased: Troy and Bennington.....	Hoosack Junction..	5	...	75,400	236,952
	Utica and Black River.....	Utica.....	87	...	1,769,620	2,662,838
	Leased: Carthage, Watertown, and Sackett's Harbor.....	Watertown.....	30	...	430,054	770,883
	Clayton and Theresa.....	Clayton.....	15	...	202,730	290,125
Branches.....	Black River and Morristown.....	Philadelphia.....	86	...	277,462	436,180
	Utica, Chenango, and Susquehanna Valley.....	Utica.....	76	...	3,793,700	4,047,433
	Branch.....	Richfield Junction..	22	...	...	...
	Utica, Ithaca, and Elmira.....	Utica.....	50	118	925,860	1,440,123
	Valley.....	Binghamton.....	11	...	750,000	818,796
	Wallkill Valley.....	Montgomery.....	33	85	754,747	1,900,281
	Warwick Valley.....	Warwick.....	10	...	225,000	199,161
		Greycourt.....	10	...	...	...
		Greene.....	76	...	3,793,700	4,047,433
		Richfield Springs...	22	...	...	...

The canals of New York are a highly important feature in its commercial facilities. (See CANAL, vol. iii., p. 685.) The Erie canal, connecting Lake Erie with the Hudson river, affords a continuous water channel through which the produce of the western states and Canada may reach the port of New York; while the several canals traversing the state from north to south supply transportation facilities to the interior of New York and Pennsylvania. The canals and navigable feeders owned by the state aggregate 857 m. in length, and the river and other improvements exclusive of lakes which have been completed increase the length of the artificial system of navigable waters to 907 m. The general su-

perintendence of the canals is vested in three commissioners elected for three years, who have charge of the construction of new and the repairs of old canals. The state engineer and surveyor inspects the canals and performs other duties, while the canal board, composed of the lieutenant governor, comptroller, secretary of state, treasurer, attorney general, state engineer and surveyor, and the canal commissioners, fix the rates of toll with the concurrence of the legislature, appoint officers, &c. The amount of freight transported on all the state canals during 1874 was 5,804,588 tons, valued at \$196,674,322, including products of the forest valued at \$17,840,356; agricultural products, \$64,344,898; manufactures, \$7,094,531;

merchandise, \$64,477,540; and other articles, \$42,916,997. The total quantity of freight carried by the canals was nearly half as great as that transported by the Erie and New York Central railroads. The amount of freight brought to the Hudson river by the Erie and Champlain canals was 3,223,112 tons, valued at \$107,976,476; 1,709,816 tons of freight, worth \$71,294,867, were brought by canal boats directly to New York. The number of boats arrived at and cleared from New York, Albany, and Troy was 30,806. Until 1874 the legislature was prohibited by the constitution from

selling or leasing any of the state canals; but in that year an amendment was adopted removing the restriction except in the case of the Erie, Oswego, Champlain, and Cayuga and Seneca canals. Besides the state canals there are belonging to corporations the Delaware and Hudson canal, extending from Honesdale, Pa., to Eddyville near Rondout, 108 m., of which 83 are in New York, and affording communication between the Delaware and Hudson rivers; and the Junction canal, which extends from Elmira to the Pennsylvania state line, 18 m. The details of the state canals are as follows:

NAME OF CANAL.	TERMINI.		Length in miles.	Total cost of construction to Sept. 30, 1872.	Financial result of operating (including ordinary repairs) from 1846 to 1872.		Income from tolls and total expense for three years ending Sept. 30, 1874.	
	From	To			Profit.	Loss.	Income.	Exp'ditures.
Black River.....	Rome.....	Lyon's Falls.....	35	\$3,417,880	.....	\$650,148	\$82,418	\$294,716
Feeder.....	Boonville.....	Head of reservoir.	12	.....	.....	.....	.....	.....
Cayuga and Seneca.....	Montezuma ..	Geneva.....	21	1,702,675	\$49,690	.....	59,675	156,102
Cayuga inlet.....	Cayuga lake..	Ithaca.....	2	2,968	2,375	.....	1,192	418
Champlain.....	West Troy ..	Whitehall.....	66 *	*	.....	.....	427,765	1,730,898
Glen's Falls feeder.....	.....	.....	12	.....	.....	.....	.....	.....
Pond above Troy dam.....	.....	.....	8	.....	.....	.....	.....	.....
Chenango.....	Utica.....	Binghamton.....	97	4,542,107	.....	1,182,292	14,416	588,911
Chemung.....	Watkins.....	Elmira.....	23	1,643,141	.....	1,200,795	10,699	212,908
Feeder.....	Horseheads..	Knoxville.....	16	.....	.....	.....	.....	.....
Crooked Lake.....	Dresden.....	Penn Yan.....	8	403,698	.....	297,091	747	86,858
Erie, including 4½ m. navigable feeders.....	Buffalo.....	Albany.....	355	\$50,412,710	\$65,118,938	.....	8,142,536	5,079,063
Genesee Valley.....	Rochester.....	Mill Grove.....	113	6,438,342	.....	1,566,016	61,588	464,315
Dansville branch.....	Shakers.....	Dansville.....	11	.....	.....	.....	.....	.....
Oneida Lake.....	Higgins.....	Oneida lake.....	7	441,289	.....	43,581	.....	34,425
Oswego.....	Syracuse.....	Oswego.....	88	4,172,503	692,994	.....	249,844	669,787
Baldwinsville canal and improvement.....	.....	Jack's reefs.....	12	29,489	.....	17,248	.....	214
Oneida river improvement.....	Oswego canal.	Oneida lake.....	20	237,151	167,388	.....	1,756	.....
Seneca river towing path..	Baldwinsville.	Mud Lock.....	6	1,488	6,469	.....	445	.....
Total.....	.....	.....	857	\$73,440,894	\$66,037,801	\$5,157,168	\$9,003,578	\$9,268,610

The above statement shows that the profits of operating the canals from 1846 to 1872 exceeded \$60,000,000, after crediting each canal with the tolls properly belonging to it and deducting the cost of collection, superintendence, and ordinary repairs, but not the taxes levied for enlargement, extraordinary repairs, payment of damages, &c., amounting to about \$25,000,000 which is placed with the construction and enlargement account. The total tolls and miscellaneous receipts of all the canals from 1836 to the close of 1874 amounted to \$115,318,504, and the expenses of collection and repairs to \$38,791,685, leaving a surplus revenue for that period of \$76,526,819. In 1874 the tolls amounted to \$2,921,721, and the disbursements to \$2,696,357, including \$1,297,716 for ordinary repairs and \$1,398,640 for extraordinary repairs and new work. The total canal revenue from all sources other than taxation was \$2,947,972.—For 30 years following 1818 the laws of New York restricted the banking business to companies or institutions chartered by special law. This was followed by the "free banking" system, which was based on the deposit of securities with redemption at a fixed rate of discount.

* Included in Erie. † Including Champlain.

State and savings banks are required to report to the superintendent of the banking department, the former quarterly and the latter semi-annually. Three examiners are constantly passing through the state inspecting banks. The superintendent reports annually to the legislature. In October, 1874, 81 banks were doing business under the laws of the state. The amount of circulation outstanding, including that of the 41 incorporated banks and of banking associations and individual bankers, was \$1,105,189, of which \$367,438 was secured. The number of national banks on Nov. 1, 1874, was 276, with a paid-in capital of \$108,339,691; bonds on deposit, \$64,963,050; outstanding circulation, \$59,299,049. The circulation *per capita* was \$13 53; ratio of circulation to the wealth of the state, 9 per cent.; to bank capital, 54·7. The total number of savings banks on Jan. 1, 1874, was 155, with 822,642 depositors and deposits aggregating \$285,520,085; average to each depositor, \$340 12; resources, \$307,589,730; liabilities, \$285,140,778; surplus assets, \$21,448,952. Insurance companies are subject to rigid inspection by the superintendent of the insurance department, who reports annually to the legislature. At the beginning of 1875 the insurance corporations of New York held more than

\$500,000,000 assets, while their risks exceeded \$8,000,000,000. The assets of the fire and marine and of the marine companies doing business in the state were returned at \$160,133,455, and of life and casualty companies at \$327,281,896; the amount insured by the former was \$6,313,967,008, and by the latter \$1,997,236,230. There were 218 fire and marine and 50 life and casualty insurance companies doing business in the state; 119 of the former and 23 of the latter were New York companies.—The constitution of New York gives the right of suffrage to every male citizen of the age of 21 years who shall have been a citizen 10 days and an inhabitant of the state one year next preceding the election, a resident of the county four months, and of the election district 30 days. The general state election is held annually on the first Tuesday after the first Monday in November. The legislature consists of a senate of 32 members elected for two years, and an assembly of 128 members chosen for one year. An apportionment of assembly and senate districts is made decennially immediately after the state census, the latest being in 1865. Under the constitutional amendments of 1874 each member of the legislature receives \$1,500 a year (previously \$3 a day for a session limited to 100 days) and 10 cents a mile for travel once to and from the capital. No one is eligible as a member who at the time of his election, or within 100 days next preceding it, was a member of congress, a civil or military officer under the United States, or an officer under any city government. The legislature meets annually on the first Tuesday in January. Special legislation is restricted by the constitution. The governor (annual salary, \$10,000 and residence) and lieutenant governor (\$5,000) are to be elected from 1876 for three years (the term having been previously, since 1821, two years). The secretary of state, comptroller, treasurer, attorney general, and state engineer and surveyor are chosen (in even years) for two years. The treasurer may be suspended from office by the governor during the recess of the legislature. Members of the legislature and all elected officers, executive and judicial, except specified inferior officers, are required before entering upon their official duties to make oath or affirmation that they have not been guilty of bribery at the election at which they were chosen. A majority of the assembly may impeach. The court of impeachment is composed of the senate and the judges of the court of appeals. The highest judicial tribunal of the state is the court of appeals, which has only appellate jurisdiction in the case of judgments and certain orders from the general term of the supreme court, the superior courts of the cities of New York and Buffalo, the New York court of common pleas, and the city court of Brooklyn. It consists of a chief (salary \$7,500 and \$2,000 expenses) and six associate judges (\$7,000 each and \$2,000 expenses), and is in session in Al-

bany the greater portion of the year. The commission of appeals, composed of five judges, was organized under a constitutional amendment of 1869 for the hearing of cases that had accumulated in the court of appeals; the former is subsidiary to the latter, and temporary. There are 33 justices of the supreme court, four in each of the eight judicial districts, except the first, comprising the city and county of New York, in which the number is five. The supreme court has general original jurisdiction. Special terms and circuits are held by one justice, the former without and the latter with a jury. General terms are held in each of the four departments into which the state is divided for this purpose, by a presiding and two associate justices designated by the governor, the concurrence of two being necessary to a decision. Its jurisdiction is appellate, appeals being made from the special term and circuits, from judgments entered by the court on referees' reports, from judgments of county courts and mayors' and recorders' courts, and from certain orders. A county court is held in each county, except that of New York. In some counties the people elect a surrogate, who has jurisdiction of probate matters; where such special courts have not been provided, the county judge performs surrogate duties. Criminal jurisdiction is exercised by courts of oyer and terminer, composed, except in the city of New York, of a justice of the supreme court, a county judge, and two justices of the peace; courts of sessions, comprising a county judge and two justices of the peace; courts of special sessions; and police courts held by a single justice. Besides the above there are mayors' and recorders' courts of cities and justices' courts, a city court in Brooklyn, and a superior court in Buffalo. The several courts peculiar to the city and county of New York are described in the article on that city. The judges of the various courts are elected by the people, those of the court of appeals and supreme court for fourteen, of county courts for six, and justices of the peace for four years. Sheriffs, county clerks, coroners, and district attorneys are chosen by the people. There are three districts, northern, eastern, and southern, for holding United States courts; sessions are held in New York city for the southern, in Brooklyn for the eastern, and in Albany, Utica, Canandaigua, Rochester, and Buffalo for the northern district. The organized state militia, called the national guard, comprises 23,360 men, classified into 8 divisions and 20 brigades, viz.: 1 regiment, 1 battalion, and 9 troops of cavalry, 12 batteries of artillery, and 31 regiments, 12 battalions, and 3 detached companies of infantry. The state exercises a strict supervision over corporations, especially those which are fiduciary or involve extensive financial interests. Corporations, except municipal, must be formed under general laws. Railroad, banking, and insurance corporations are subject to the inspection of special departments, to which

sworn reports must be made, and by which reports are annually made to the legislature and published. A married woman may hold to her separate use real and personal property, if acquired from any other person than her husband, and may convey and devise it; she may also carry on business on her own account, and sue and be sued. Neither license, magistrate, nor minister is necessary to a valid marriage contract; it has even been held that the agreement of the parties constitutes legal marriage. The sole ground of divorce occurring after marriage is adultery; at the time of marriage, impotence, idiocy, or lunacy, and consent obtained by force or fraud. The legal rate of interest is 7 per cent.; usurious contracts are void; taking of usury is a misdemeanor; and corporations cannot interpose the defence of usury. New York is represented in congress by two senators and 33 representatives, and has

therefore 35 votes in the electoral college.—The state debt, with the unapplied balances of the sinking funds, Sept. 30, 1874, was as follows:

CHARACTER OF DEBT.	Debt.	Balance of sinking funds.	Balance of debt after applying sinking funds.
General fund.....	\$3,988,526	\$4,142,694	.....
Contingent.....	68,000	82,828	\$85,176
Canal.....	10,230,430	1,561,019	8,669,411
Bounty.....	15,912,500	7,125,288	8,787,222
Total.....	\$80,199,456	\$12,861,814	\$17,491,509

The only contingent debt of the state is \$68,000 incurred for the Long Island railroad, the interest of which is paid and the payment of the principal provided for by that company. The condition of the several trust funds on Sept. 30, 1874, is shown in the following statement:

FUNDS.	Capital Sept. 30, 1874.	REVENUE AND EXPENDITURE.		
		Receipts during the year, includ- ing balances Oct. 1, 1873.	Payments during the year.	Balance Sept. 30, 1874.
School fund.....	\$3,054,772 10	\$392,372 45	\$301,908 96	\$468 49
Literature fund.....	271,980 76	50,157 13	45,894 20	4,322 93
United States deposit fund.....	4,014,520 71	276,310 96	238,862 24	37,448 72
College land scrip fund.....	473,402 87	24,284 54	22,342 47	1,942 07
Cornell endowment fund.....	128,596 61	12,508 91	11,135 00	1,373 91
Elmira female college educational fund.....	50,000 00	8,500 00	8,500 00	.....
Long Island railroad company sinking fund.....	82,823 49	17,786 30	14,250 63	3,555 67
Trust fund for payment of bounties.....	20,830 00	.....	.....	.....

The total receipts into the treasury on account of all the funds except the canal and the free school funds (the latter arising from the state tax), for the year ending Sept. 30, 1874, were \$26,465,370, and the payments \$19,636,308. Among the ordinary public expenditures were: executive department, \$31,255; legislative, \$289,991; judiciary, \$400,578; public offices, salaries, clerk hire, and expenses, \$301,734; printing for the state, \$181,131; military, \$356,159; educational, including common, normal, and Indian schools, academies, &c., \$3,278,858; state prisons, including transportation of convicts, \$967,930; support of deaf and dumb, blind, insane, and idiotic, \$338,852; quarantine, \$215,483. The statute requires real and personal estate to be assessed for taxation "at the full and true value thereof," but it is

maintained by high authority that not more than one third in value of the property liable to taxation is placed upon the assessment rolls. The aggregate taxation of 1874 included state tax \$13,015,847, school \$2,711,634, county \$32,119,578, and town \$9,964,321. The rate of the state tax was $7\frac{1}{4}$ mills, viz.: schools, $1\frac{1}{4}$; general purposes, $1\frac{1}{2}$; general purposes (deficiency), $\frac{6}{10}$; bounty debt, 2; new capitol, $\frac{1}{2}$; asylums and reformatories, $\frac{1}{16}$; canal floating debt, $\frac{1}{10}$; new work on canals and extra repairs, $\frac{1}{8}$; for payment of awards by canal appraisers and commissioners, and certain certificates of indebtedness, $\frac{1}{32}$. The total amount produced by this rate (state and school taxes) was \$15,727,481. The valuation of property and taxation for a series of years are shown in the following exhibit:

YEARS.	Real estate.	Personal.	Aggregate valuation.	State taxes, exclusive of school taxes.	Rate of total state tax, in mills, on each dollar of valuation.	Town, county, and school taxes.	Total taxes.	Rate of tax on \$1; valuation in cents.
1845.....	.....	.....	\$605,646,095	\$361,809	6-10	\$3,809,218	\$4,170,527	0-688
1855.....	.....	.....	1,402,849,304	1,751,717	1 1-4	9,924,454	11,676,172	0-832
1865.....	\$1,158,827,371	\$392,552,314	1,550,879,685	6,067,816	4 53-80	39,393,623	45,961,440	2-963
1866.....	1,196,403,416	394,826,220	1,531,229,636	7,369,042	5 9-16	39,199,202	40,568,244	2-640
1867.....	1,237,703,092	426,404,633	1,664,107,725	10,567,084	7 3-5	35,951,887	46,518,921	2-795
1868.....	1,327,403,886	438,655,254	1,766,059,140	8,035,705	5 4-5	36,262,730	44,298,435	2-508
1869.....	1,418,182,855	441,987,915	1,860,120,770	8,138,028	5 5-8	35,023,503	46,161,681	2-482
1870.....	1,532,720,907	434,250,278	1,967,001,185	11,827,225	7 41-156	38,501,459	50,328,684	2-558
1871.....	1,599,980,166	452,607,732	2,052,637,898	9,043,271	5 79-120	36,626,215	45,674,486	2-225
1872.....	1,644,379,410	447,248,035	2,085,627,445	16,970,097	9 3-8	46,541,888	63,511,936	3-041
1873.....	1,692,523,071	437,102,315	2,129,626,386	12,138,870	6 95-100	39,305,665	51,444,536	2-416
1874.....	1,750,698,913	418,608,955	2,169,307,873	13,015,847	7 1-4	44,795,534	57,811,381	2-664

—All the charitable, eleemosynary, correctional, and reformatory institutions of the state, except prisons, whether receiving state aid or maintained by municipalities or otherwise, are subject to the inspection of the state board of charities, composed of 11 members appointed by the governor with the consent of the senate, besides the lieutenant governor, secretary of state, comptroller, attorney general, and state commissioners in lunacy, all of whom serve without pay. The board reports annually to the legislature concerning the various institutions visited by them, which embrace the state, local, incorporated, and private charities for the insane, blind, deaf and dumb, idiots, inebriates, juvenile delinquents, orphans, paupers, &c. The number of insane in New York on Jan. 1, 1872, was reported at 6,775, of whom 1,093 were in state and 312 in private institutions, 2,233 in city asylums and almshouses, 1,319 in county asylums and poorhouses, 75 in the Auburn asylum for insane criminals, 161 in the institutions of other states, and 1,582 in the custody of friends. In 1874 \$102,234 was paid by the state for the maintenance of insane persons, besides large appropriations for buildings, &c. There are five state institutions for the treatment of this class, of which the oldest is the lunatic asylum in Utica, opened in 1843 and having accommodations for about 600. Acute cases are chiefly treated here, while the chronic insane are received in the Willard asylum, opened at Ovid, Seneca co., in 1869, which, with projected improvements, will accommodate 1,000. The Hudson river hospital for the insane in Poughkeepsie, the state asylum in Buffalo, and the homœopathic asylum in Middletown are state institutions not yet (1875) completed. The estimated cost of each of the two former is \$3,000,000; when completed each will accommodate about 600 patients. The institution at Middletown is smaller. On Sept. 30, 1874, there were 1,719 inmates, 590 being in the Utica asylum, 879 in the Willard, 212 in that at Poughkeepsie, and 38 in that at Middletown. There is also a state institution on Ward's island, New York city, for insane immigrants. In addition to these there are two city institutions in New York city, Brigham hall at Canandaigua, Marshall infirmary in Troy, the Providence lunatic asylum (Roman Catholic) in Buffalo, and the asylum at Bloomingdale, all of which are incorporated; and Sanford hall, Flushing, the home for nervous diseases at Fishkill, and the home for insane and nervous invalids at Pleasantville, which are private. The Bloomingdale asylum is one of the oldest institutions of the kind in the United States, having been opened in 1821, and has a wide reputation for the excellence of its management. Any person or association is prohibited by law from establishing or keeping an institution of any kind for the reception of persons of unsound mind, without license from the board of state charities. The whole

number treated in the incorporated and private asylums of the state in 1873, not including the two New York city institutions, was 732, of whom 449 remained on Jan. 1, 1874. The state asylum for idiots in Syracuse was established in 1851 as an educational and not a custodial institution. It has accommodations for 225 pupils; the indigent are received free of charge. The daily average number of pupils in 1873 was 178, of whom 154 were supported by the state at a cost of \$43,000. The blind are instructed at the state asylum in Batavia, opened in 1867, and the New York institution for the blind (incorporated) in New York city, founded in 1831; the former has accommodations for 150, and the latter for 225 pupils. The New York institution for the instruction of the deaf and dumb, in New York city, is maintained chiefly by the state. It is the largest of the kind in the world, having a capacity for 550 pupils, and, excepting the American asylum in Hartford, the oldest in the United States, having been opened in 1818. Its plan comprises an educational and an industrial department. All indigent deaf mutes between the ages of 6 and 25 years are received free of charge. At the close of 1874 there were 30 instructors and 584 pupils, of whom 355 were beneficiaries of the state, 162 of counties, and 47 of New Jersey, the remainder being maintained by friends. Articulation and lip reading were taught to about 100. Pupils are also maintained by the state at the institution for the improved instruction of deaf mutes in New York city, and at the Le Couteulx St. Mary's institution in Buffalo. The state asylum for inebriates at Binghamton was opened in 1864. The buildings cost \$500,000, and will accommodate 200 patients. The state institutions for the reformation of juvenile delinquents are the house of refuge on Randall's island, New York city, opened in 1825, and having a capacity for 1,000, and the western house of refuge in Rochester, with accommodations for 600, opened in 1849. An industrial reformatory, with a capacity for 500, is in process of construction at Elmira. Besides these there are 11 incorporated and municipal reformatories in the state, which from time to time have received state aid, but are mainly supported by private gifts and municipal appropriations. The total number of inmates in all reformatories on Jan. 1, 1874, was 4,580. There are also many organizations in the state for the care of destitute children, such as the children's aid society of New York city and the various missions and industrial schools of that and other cities. The total property valuation of the state charitable institutions above named was \$6,184,302. The receipts for the year were \$1,621,132, of which \$1,015,251 was from the state, and the expenditures \$1,589,183, of which \$711,805 was for buildings and improvements. State paupers are received at almshouses in Albany, Yaphank, Delhi, Canton, and Buffalo. The private and

incorporated charities of the state comprise 128 orphan asylums and homes for the friendless, 46 hospitals, and 57 dispensaries.—The prison system of New York comprises three state prisons, six county penitentiaries, two state and eleven local reformatories, besides county jails, city prisons, &c. The general supervision of the prisons is vested by the constitution in three inspectors elected for three years. All prison officers are appointed by the inspectors. Cigars, shoes, harness and saddlery hardware, tools, machinery, and axles are made at Auburn and Sing Sing, while in the latter a large number of convicts are employed in the marble and lime works. In the Clinton prison, at Dannemora, the manufacture of iron, nails, &c., from ore mined on the premises, is the chief employment of the convicts. All the industries are managed by contract in Auburn, all but stone cutting in Sing Sing, and none in Clinton prison. No one of the prisons is self-sustaining. In all instruction is afforded to convicts, and all have libraries. The condition of these institutions for the year ending Sept. 30, 1874, was as follows:

PARTICULARS.	Auburn.	Clinton.	Sing Sing.
Number of cells.....	1,292	548	1,200
Capacity for inmates.....	1,300	540	2,508
Number of prisoners.....	1,104	548	1,354
Sept. 30, 1873.....	664	153	928
Admitted during the year..	548	164	976
Discharged.....	1,204	552	1,306
In prison Sept. 30, 1874.....			
Advances from state treasury.....	\$233,167	\$337,678	\$360,054
Earnings.....	\$101,910	\$153,473	\$124,009
Excess of expenditures.....	\$181,257	\$184,205	\$236,045

Including \$26,231 miscellaneous expenditures not distributed, the entire excess of expenditures was reported at \$588,537. This, however, is reduced by stock on hand, permanent improvements, and unpaid accounts of the previous year, amounting to \$68,358 in favor of Auburn, \$225,748 of Clinton, and \$163,370 of Sing Sing. With these deductions, the real excess of expenditures over earnings becomes \$131,060. The expense of maintaining each convict is from \$3 to \$4 a week in excess of the income. The prisons are full, and a greater capacity is needed. The six penitentiaries are situated in Buffalo, Syracuse, Brooklyn, Rochester, Albany, and New York (Blackwell's island). In the three first named, trades are taught to the inmates and evening schools are held. The state has no share in the management of these institutions, which are under the control of the counties where situated; but state prisoners are confined in them. The total number of prisoners in the penitentiaries at the beginning of 1874 was 5,940. The prison association of New York is an organization for the repression of crime, the reformation of the criminal classes, the aid of discharged convicts, &c. It has agents in all parts of the state and at all the prisons, who visit persons detained under charge of crime, with a view of

aiding them to obtain justice, and who look after the interests of discharged convicts. In 1873, 1,257 discharged prisoners were aided by the general agency in New York city, while 4,735 in prison accused of crime were visited and advised, of whom 204, being friendless, were defended. Annual reports are made to the legislature.—The common school system of New York may be traced to a law passed by the legislature in 1812, which provided for the division of the state into school districts, the distribution of the interest of the school fund in the ratio of the number of children from 5 to 15 years of age, and the annual levy by each town of a tax for school purposes. As early as 1795, however, an annual appropriation of \$50,000 for five years was made by the legislature for public instruction. The acts relating to public instruction were revised and consolidated in the general law of 1864, which was several times amended until 1867, when the free school system of the state was fairly established. For school purposes the state is divided into general districts and city districts created by special acts. There is no state board of education. The general supervision of the common schools is vested in a state superintendent, who is elected for three years by a joint ballot of the legislature, receives an annual salary of \$5,000, besides an allowance of \$3,000 for a deputy and between \$8,000 and \$9,000 for clerk hire, and makes an annual report to the legislature. By virtue of his office he is a regent of the university, chairman of the executive committee of the state normal school at Albany, a trustee of the people's college and of the state asylum for idiots, and is required to provide for the education of all Indian children in the state. The office of county superintendent was abolished in 1847, and that of town superintendent in 1857. Their duties are performed by district commissioners elected for three years by the people. Each school district has also one or three trustees, who exercise authority in relation to school funds, property, &c., and report annually to the district commissioner. The common schools are free to all persons between 5 and 21 years of age. Separate schools are provided for the Indians, and any city or incorporated village may establish schools exclusively for colored children. The compulsory educational law of 1874, which went into effect on Jan. 1, 1875, requires all children not physically or mentally incapacitated, between the ages of 8 and 14 years, to attend some public or private day school not less than 14 weeks every year, 8 of which must be consecutive; or they must be taught at home for the same time in spelling, reading, writing, English grammar, geography, and arithmetic. Manufacturers and others are prohibited, under penalty of \$50, from employing during school hours children under 14 years of age who have not received the instruction required by the act. Boards of trustees are directed to make provision for the instruc-

tion of habitual truants. Free district libraries constitute a feature of the educational system, for which the legislature annually appropriates \$55,000, and for which each district is author-

ized to levy a small tax yearly. The following statement contains the comparative statistics of the common schools for the years ending Sept. 30, 1868 and 1874 :

PARTICULARS.	1868.	1874.		
	Total.	Cities.	Towns.	State.
Number of school districts.....	11,736	.....	11,299	11,299
“ of teachers employed at the same time for 28 weeks or more..	16,596	5,235	18,370	18,605
“ of children between 5 and 21 years of age.....	1,464,669	739,810	857,086	1,596,846
“ of male teachers employed.....	5,918	622	6,565	7,187
“ of female teachers employed.....	21,865	5,567	16,868	22,435
“ of children attending school.....	970,842	498,049	606,315	1,044,364
Average daily attendance.....	445,868	215,907	299,318	515,225
Number of times schools have been visited by commissioners.....	18,963	.....	17,967	17,967
“ of volumes in district libraries.....	1,064,830	140,735	690,819	831,554
Total number of school houses.....	11,674	425	11,356	11,781
Value of school houses and sites.....	\$16,459,485	\$19,006,446	\$10,209,703	\$29,216,149

Indian schools were maintained in 28 districts at nine reservations, at a cost of \$7,262, and were attended by 1,018 children, who were taught by 19 white and 12 Indian teachers. State moneys for the support of common schools are derived chiefly from the income of the common school fund, the principal of which in 1874 was \$3,054,772; the United States deposit fund of \$4,014,520, which is a nominal loan received on deposit from the

surplus funds of the United States in 1836; and the state school tax of 1½ mill. The amount derived from these sources in 1874 was: school fund, \$178,813; United States deposit fund, \$165,000; state tax, \$2,664,631; total, \$3,008,444. The total expenditures for the support of public schools amounted to \$9,040,942 in 1868, and \$11,088,981 in 1874. The receipts and expenditures for these two years were as follows:

PARTICULARS.	1868.	1874.		
	Total.	Cities.	Towns.	State.
RECEIPTS.				
Amount on hand at the beginning of the year.....	\$1,199,547 58	\$314,804 65	\$238,388 60	\$1,052,698 25
Apportionment of public moneys.....	2,302,515 70	1,070,648 86	1,676,580 24	2,747,224 10
Proceeds of the gospel and school lands.....	23,134 62	44 59	36,553 68	36,598 27
Raised by tax.....	6,338,861 77	4,941,827 50	2,922,876 01	7,564,703 51
Estimated value of teachers' board.....	375,455 27	.....	199,706 71	199,706 71
From all other sources.....	272,162 66	112,221 24	285,582 28	897,803 52
Totals.....	\$10,511,677 60	\$6,939,041 84	\$5,359,687 52	\$12,293,729 36
EXPENDITURES.				
For teachers' wages.....	\$5,597,506 94	\$3,880,536 24	\$3,720,982 49	\$7,601,518 78
For libraries.....	26,632 34	15,070 94	17,942 32	33,013 26
For school apparatus.....	234,523 09	188,219 32	86,595 96	224,815 28
For colored schools.....	64,807 59	58,458 18	7,668 37	66,126 55
For school houses, sites, &c.....	2,184,064 95	1,146,008 79	816,189 21	1,962,198 00
For all other incidental expenses.....	933,187 60	705,804 95	495,325 60	1,201,130 55
Forfeited in hands of supervisors.....	214 51	.....	179 83	179 83
Amount on hand at the end of the year.....	1,470,735 58	944,943 42	864,804 24	1,209,747 66
Totals.....	\$10,511,677 60	\$6,939,041 84	\$5,359,687 52	\$12,293,729 36

Much importance is attached to the training of teachers for the public schools. Teachers are required to have received a diploma from a state normal school, or a certificate from the superintendent of public instruction, the district commissioner, or city or village school officer. The state maintains, by an annual appropriation of about \$150,000, eight normal schools, from which 3,028 students had graduated up to the summer of 1874, besides a large number who had received instruction without completing the course. The courses of instruction comprise an elementary English and an advanced English course of two years each, and a classical course of three years. The course of instruction and practice at the Albany school is two years. Special classes are also

formed for the benefit of those desiring a few weeks' instruction each year. Each county is entitled to send to a state normal school, free of charge for tuition and text books, twice as many pupils as it has representatives in the assembly; to other pupils a charge is made for instruction. Applicants for admission must be at least 16 years of age and must pass examination. State pupils are appointed by the state superintendent of public instruction, subject to the required examination, on recommendation of the school commissioners or city superintendents. Teachers' institutes have been maintained by the state since 1847. These are held annually in the several counties, for a period of about two weeks, with special reference to the wants of teachers in the rural districts.

During the year ending Jan. 1, 1875, institutes were held in 58 counties, at a cost to the state of \$16,319, and were attended by 11,478 teachers. The most important facts concerning the state normal schools for 1873-'4 are as follows:

WHERE SITUATED.	When opened.	Received from state annual appropriation.	NORMAL DEPARTM'T.	
			Number of instructors.	Number of pupils.
Albany.....	1844	\$17,964 83	15	544
Brockport.....	1867	17,999 36	19	291
Buffalo.....	1871	17,869 82	12	303
Cortland.....	1869	17,952 94	14	899
Fredonia.....	1863	20,532 03	17	237
Geneseo.....	1871	18,270 10	16	307
Oswego.....	1863	17,861 14	14	429
Potsdam.....	1869	17,881 90	14	865
Total.....	.....	\$146,632 17	121	2,875

Teachers' classes, attended by 2,044 pupils ranging from 10 to 20 weeks, were also maintained in 92 academies designated by the board of regents.—The university of the state of New York is a corporate body created in 1784, with functions mainly of supervision and visitation, and not of instruction. The board of regents of the university, reorganized in 1787, comprises 19 members elected by joint ballot of the legislature, besides the governor, lieutenant governor, secretary of state, and superintendent of public instruction. The officers are a chancellor, vice chancellor, treasurer, secretary, and assistant secretary. The regents are empowered to incorporate and visit literary and medical colleges and academies, and to require from them annual reports as to their system of instruction, discipline, finances, pupils, &c. These reports or abstracts of them are embodied by the regents in their annual report to the legislature. They are also empowered to confer degrees above that of master of arts. They are *ex officio* trustees of the state library and of the state museum of natural history; and many valuable papers showing the progress of science and the useful arts are contained in their reports on the museum. The colleges and academies are mainly dependent on private bounty and tuition fees. The state, however,

has often made large contributions to their endowments, besides establishing the "literature fund," the annual income of which is appropriated toward the salaries of teachers in the academies. Since 1853 an endowment fund of at least \$100,000 paid in or secured has been a condition of the incorporation of a college by the regents. Most of the colleges incorporated since that date have received their charters directly from the legislature. The property and funds of these institutions are vested in trustees, and must be used only for public instruction. These trustees are amenable to the legislature and the courts. Since 1838 \$40,000 derived from the literature and United States deposit funds has been annually distributed among the academies, according to the number of pupils holding the regents' certificate of academic scholarship. Besides this, about \$18,000 is annually distributed to the academies for instruction of teachers, and \$3,000 for the purchase of books and apparatus. Academic departments of union schools are admitted to the benefits of these appropriations on the same terms as academies. There are subject to the visitation of the regents 23 literary and 14 medical colleges, and about 250 academies and academical departments of union schools. This enumeration embraces only incorporated institutions. In order to raise the standard of education and to secure greater fidelity on the part of teachers in the academies, examinations in writing are held by the regents. Each pupil who satisfactorily answers the questions receives a certificate which entitles him to certain educational facilities. Since 1863 the university convocation, comprising the officers of colleges and academies, has been held annually under the direction of the board of regents, for the consideration of the interests of higher education. Besides the 1,044,364 pupils in the common and 6,515 in the normal schools in 1873-'4, there were 31,421 in academies, 2,675 in colleges, 187,840 in private, 582 in law, and 924 in medical schools; total, 1,224,321. The incorporated colleges and the professional institutions in the state in 1874-'5, excepting those in the city of New York, were as follows:

NAME OF INSTITUTION.	Where situated.	Date of charter.	Denomination.	Number of instructors.	Number of students.
Alfred university.....	Alfred Centre.....	1857	Seventh-Day Baptist.....	20	455
Cornell university.....	Ithaca.....	1865	Not denominational.....	50	521
Elmira female college.....	Elmira.....	1855	Presbyterian.....	13	167
Hamilton college.....	Clinton.....	1812	Presbyterian.....	13	145
Hobart college.....	Geneva.....	1824	Protestant Episcopal.....	7	52
Ingham university (for women).....	Le Roy.....	1857	Presbyterian.....	17	150
Madison university.....	Hamilton.....	1846	Baptist.....	11	101
St. Lawrence university.....	Canton.....	1856	Unitarian.....	8	54
St. Stephen's college.....	Annandale.....	1860	Protestant Episcopal.....	8	42
Syracuse university.....	Syracuse.....	1870	Methodist Episcopal.....	19	147
Union college.....	Schenectady.....	1795	Union.....	17	160
University of Rochester.....	Rochester.....	1846	Baptist.....	9	156
Vassar college (for women).....	Poughkeepsie.....	1861	Not denominational.....	84	225
Wells college.....	Aurora.....	1870	Not denominational.....	13	89
SCHOOLS OF LAW.					
Albany law school.....	Albany.....	1851	.....	5	106
Law school, Hamilton college.....	Clinton.....	.....	.....	1	22

NAME OF INSTITUTION.	Where situated.	Date of charter.	Denomination.	Number of instructors.	Number of students.
SCHOOLS OF MEDICINE.					
Albany medical college.....	Albany.....	1839	Regular.....	8	118
College of physicians and surgeons, Syracuse university (formerly Geneva medical college, founded in 1834)	Syracuse.....	1872	".....	16	66
Long Island hospital college.....	Brooklyn.....	1853	".....	30	125
Medical department, university of Buffalo.....	Buffalo.....	.....	".....	10	101
SCHOOLS OF SCIENCE.					
College of agriculture and mechanic arts, Cornell university.....	Ithaca.....	1865	.....	..	66
Engineering school, Union college.....	Schenectady.....	.....	.....	..	...
Rensselaer polytechnic institute.....	Troy.....	1826	.....	18	170
SCHOOLS OF THEOLOGY.					
Auburn theological seminary.....	Auburn.....	1820	Presbyterian.....	6	47
De Lancey divinity school.....	Geneva.....	1860	Episcopalian.....	2	4
Hamilton theological seminary.....	Hamilton.....	1819	Baptist.....	4	42
Hartwick theological seminary.....	Hartwick Seminary	1816	Lutheran.....	6	87
Martin Luther college.....	Buffalo.....	1853	Lutheran.....	4	9
Newburgh theological seminary.....	Newburgh.....	1835	United Presbyterian	3	17
Rochester theological seminary.....	Rochester.....	1850	Baptist.....	7	80
St. Joseph's provincial seminary.....	Troy.....	.....	Roman Catholic.....	6	126
St. Lawrence theological school.....	Canton.....	1856	Universalist.....	3	23
Seminary of Our Lady of Angels.....	Niagara City.....	1863	Roman Catholic.....	22	218

Union university, comprising Union college in Schenectady, the Albany medical college, and Dudley observatory, was incorporated in 1873. For the United States military academy, see **MILITARY SCHOOLS.** The state agricultural college is connected with Cornell university, and is described in the article on that institution. Full details of other colleges mentioned above are also given in special articles on the respective institutions.—The whole number of newspapers and periodicals reported by the census of 1870 was 835, having an aggregate circulation of 7,561,497, and issuing annually 471,741,744 copies. There were 87 daily, with a circulation of 780,470; 5 tri-weekly, 5,800; 22 semi-weekly, 114,500; 518 weekly, 3,388,497; 21 semi-monthly, 216,300; 163 monthly, 2,920,810; and 19 quarterly, 135,120. These were further classified as follows:

PUBLICATIONS.	Number.	Copies annually issued.	Circulation.
Advertising.....	17	1,378,800	89,900
Agricultural and horticultural.....	10	7,621,800	307,150
Benevolent and secret societies.....	12	1,161,200	47,600
Commercial and financial.....	50	13,778,600	326,950
Illustrated, literary, and miscellaneous.....	103	72,448,180	2,047,865
Devoted to nationality.....	6	1,606,800	23,800
Political.....	437	323,171,724	2,268,532
Religious.....	90	40,798,240	2,095,120
Sporting.....	4	2,780,000	65,000
Technical and professional.....	55	6,996,400	289,580

In 1874 there were reported 98 daily, 5 tri-weekly, 20 semi-weekly, 681 weekly, 2 bi-weekly, 26 semi-monthly, 201 monthly, 4 bi-monthly, and 18 quarterly; total, 1,055. The total number of libraries of all classes reported by the federal census of 1870 was 20,929, containing 6,310,352 volumes; 7,158 with 2,785,483 volumes were private, and 13,771 with 3,524,869 were other than private. The latter were distributed as follows:

CHARACTER.	Number.	Volumes.
State.....	2	66,019
Town, city, &c.....	130	173,236
Court and law.....	26	77,535
School, college, &c.....	9,875	1,165,153
Sabbath school.....	8,105	994,627
Church.....	486	253,163
Charitable and penal institutions.....	1	5,000
Circulating.....	144	790,131

The largest public libraries of the state, with the number of volumes in 1874, are given in **LIBRARY**, vol. x., p. 405.—The whole number of religious organizations in 1870 was 5,627, having 5,474 edifices with 2,282,876 sittings, and property valued at \$66,073,755. The leading denominations were represented as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Property.
Baptist, regular.....	817	795	309,311	\$7,439,350
" other.....	85	84	23,775	162,925
Christian.....	95	95	28,175	224,850
Congregational.....	263	256	111,735	2,732,500
Episcopal, Protestant.....	475	465	204,920	7,211,150
Evangelical Association.....	25	25	7,300	228,350
Friends.....	89	87	24,910	596,300
Jewish.....	47	33	21,400	1,831,950
Lutheran.....	190	182	70,133	1,560,500
Methodist.....	1,745	1,702	606,098	11,768,290
Miscellaneous.....	4	2	1,000	30,600
Moravian (Unitas Fratrum).....	6	6	3,000	134,600
New Jerusalem (Swedenborgian).....	4	3	1,950	175,000
Presbyterian, regular.....	672	656	325,780	12,786,900
" other.....	54	49	24,090	644,140
Reformed church in America (late Reformed Dutch).....	304	300	147,033	7,076,250
Reformed church in the United States (late German Reformed).....	9	8	8,450	134,000
Roman Catholic.....	455	433	271,285	8,558,150
Second Advent.....	17	11	8,120	45,650
Shaker.....	3	3	2,300	23,000
Spiritualist.....	3	2	550	31,000
Unitarian.....	22	19	8,850	715,200
United Brethren in Christ.....	7	6	1,850	10,200
Universalist.....	124	120	41,610	1,155,950
Union (local missions).....	14	14	7,000	580,900
Unknown.....	93	93	32,801	216,050

—At the arrival of the whites the S. E. part of New York was inhabited by several subordinate tribes of Indians belonging to the Algonquin race, and the remaining part of the state by the celebrated Five Nations of Iroquois stock. The names of places bequeathed by the various tribes indicate to what race they belonged; the Algonquin words being harsh and full of gutturals, while the Iroquois names are usually smooth, soft, and musical. In July, 1609, Samuel Champlain, having ascended the St. Lawrence river, discovered the lake which bears his name. On Sept. 9, 1609, Henry Hudson, in the employ of the Dutch East India company, discovered the bay of New York, and three days later entered the river which bears his name. The land discovered by Hudson was claimed by Holland and named New Netherland. In 1614 the states general granted special privileges to any company which should open a trade with the natives of this region. In this year the first Dutch settlements were made on Manhattan island, and the name New Netherland was applied to the unoccupied regions of America lying between Virginia and Canada. In 1621 the Dutch West India company was incorporated, and in the following year by virtue of their charter took possession of New Netherland. The first permanent agricultural colonization of this country was made in 1623, when 18 families settled at Fort Orange (now Albany), and a company of Walloons on the W. shore of Long Island. In 1626 Peter Minuit, the director general, purchased Manhattan island of the natives for the value of \$24. In 1629 the company passed an act enabling all who wished to obtain manorial possessions in the country, under which the most valuable part of the company's land soon passed into the hands of individuals, and an aristocratic element was introduced. The effort to establish feudal privileges failed; but the land monopolies granted at this time led, more than two centuries afterward, to serious disturbances known as the "anti-rent difficulties." Wouter van Twiller, the successor of Minuit, appointed in 1633, was succeeded in 1638 by William Kieft. During the administration of the latter, some troubles having arisen with the natives, an attack was suddenly made by the whites upon the nearest Indian villages, and more than 100 unoffending men, women, and children were massacred. A bloody war ensued, which seriously endangered the existence of the colony. In 1647 Kieft was succeeded by Peter Stuyvesant, by whom the Indians were conciliated and the general affairs of the colony more systematically administered. The Dutch settlements, spreading to the east and west, came in collision with the English upon the Connecticut, and with the Swedes upon the Delaware. In 1655 Stuyvesant took forcible possession of the Swedish territory and annexed it to New Netherland. The border contests with the English contin-

ued as long as the Dutch held possession of the country. The English claimed New Netherland as part of Virginia, a claim founded upon the prior discovery of Cabot. In 1622 the English minister at the Hague demanded that the enterprise of planting a Dutch colony upon the Hudson should be abandoned. In 1627 Gov. Bradford of Plymouth gave notice to Peter Minuit that the patent of New England extended to lat. 40°, and that the Dutch had no right "to plant and trade" north of that line. In March, 1664, Charles II. granted a charter of all the lands lying between the Connecticut and the Delaware to his brother the duke of York. This included New Netherland and a portion of the territory which had been previously granted to Connecticut, Massachusetts, and New Hampshire. In August of the same year, without any declaration of war, Col. Nicolls at the head of an English force appeared before New Amsterdam, and demanded its surrender. Being in no condition to resist, Gov. Stuyvesant complied, and the whole country quietly passed into the hands of the English. New Amsterdam was named New York, and the name of New York was also applied to the whole province. New York was subsequently recaptured by the Dutch, but was soon after restored to the English. The Dutch engaged in the slave trade as early as 1627, and at the surrender in 1664 the colony contained more slaves in proportion to its inhabitants than Virginia. In August, 1688, New York was placed with New England under the administration of Andros, Francis Nicholson being appointed lieutenant governor of New York. In 1689 the people revolted from the tyranny of Nicholson, and, under the lead of Jacob Leisler, a merchant of New York, seized the government and administered it in the name of William and Mary. Although never officially recognized as governor, Leisler continued at the head of affairs for about two years, when he was superseded by Gov. Sloughter, bearing a commission direct from the English sovereigns. Offering some slight resistance to Sloughter upon his arrival, Leisler and his son-in-law Milborne were arrested, tried for treason, and executed. In 1684 Gov. Dongan concluded an offensive and defensive treaty with the Indians, and from that time the English became the recipients of that friendship which had been before bestowed upon the Dutch. In 1687 the Seneca country in western New York was invaded by a French army under De Nonville, governor of Canada; and in 1689 the Five Nations retaliated by invading Canada. In this last expedition more than 1,000 French settlers were slain, and the whole French province was threatened with destruction. On the night of Feb. 9, 1690, a party of French and Canadian Indians burned Schenectady, and massacred nearly all the inhabitants. In 1693 a French expedition against the Mohawks took one of the Indian forts and captured 300 prisoners,

but the greater part of the invaders perished with cold before reaching Canada. The peace of Ryswick in 1697 concluded the hostilities between England and France, and Count Frontenac, then governor of Canada, turned his whole force against the Five Nations. His plans were frustrated by the earl of Bellamont, then royal governor of New York, who declared he would make common cause with the Indians in case any attack was made upon them. During the continuance of Queen Anne's war, from 1702 to 1713, hostilities in New York were confined to skirmishes upon the frontiers, and to the preparation for expeditions which failed for want of promised aid from England, but which involved the colony largely in debt. In 1731 the French built Fort Frederick at Crown Point on Lake Champlain, commanding the natural pass between the Hudson and the St. Lawrence. The final conflict between England and France to determine the sovereignty of North America began in 1754. Along the frontiers of New York the French had erected fortresses on Lake Champlain, at Frontenac (now Kingston) on the St. Lawrence, and at Niagara. The English advanced posts were at Fort Edward on the Hudson, and at Oswego on Lake Ontario. In 1755 a large force under Sir William Johnson marched against Crown Point. At the head of Lake George he was attacked by the French under Dieskau, but the victory was finally obtained by the English, and the French force was nearly annihilated. In 1756 Oswego was taken by the French and destroyed. In 1757 Fort William Henry, at the head of Lake George, was taken by the French, and the garrison, after capitulation, were nearly all massacred by the Indians. In 1758 Abercrombie at the head of 15,000 men, the largest and best appointed army ever raised in America, was defeated in an attack upon Ticonderoga; and during the same year Col. Bradstreet marched through the wilderness and took Fort Frontenac. In 1759 Niagara was taken by Gen. Prideaux and Sir William Johnson, and Ticonderoga and Crown Point were abandoned on the approach of an English army under Gen. Amherst, leaving no French force within the limits of the colony. During the last years of the war, under the administration of Pitt, the English pursued a liberal policy toward the colonies; but in 1760 they recommenced aggressions, which provoked opposition. New York entered zealously into the measures for common defence. In October, 1775, Tryon, the last royal governor, took refuge on board a British man-of-war. In May of that year Ticonderoga and Crown Point had been surprised and taken by a party of "Green Mountain Boys" under Ethan Allen. In February, 1776, an American force took possession of New York city; after the battle of Long Island (Aug. 27), the city and its environs fell into the hands of the British. In the summer of 1777 Burgoyne invaded the province from Canada, and a British force from New

York passed up the Hudson to coöperate with him. Several fortresses on Lake Champlain and the Hudson were taken by the enemy, but, after a series of reverses, Burgoyne's army on Oct. 17 was obliged to surrender at Saratoga. In the winter of 1777-'8 West Point was fortified, and soon became the most important fortress in America. Under the lead of Sir John Johnson, the Six Nations espoused the English cause, and continually harassed the defenceless frontier settlements. In 1779 Gen. Sullivan marched through the Indian country in western New York, and destroyed their villages. During the next two years the Indians made frequent attacks upon the Schoharie and Mohawk settlements, until the whole of that flourishing region was laid waste. On Nov. 25, 1783, New York was evacuated by the British. The original grant of New York included all lands between the Delaware and Hudson rivers, conflicting with patents previously granted to Connecticut, Massachusetts, and New Hampshire. In 1664, soon after the date of the first patent, the proprietor sold the territory included in the present state of New Jersey. The Connecticut boundary was established in 1731. The claims of Massachusetts were finally settled in 1786, by a compromise which gave New York the sovereignty of the whole territory, but yielded to Massachusetts the right of soil to that portion of the state which lies west of a meridian line passing through the 82d milestone of the Pennsylvania boundary. This line, known as the "preemption line," begins at the S. E. corner of Steuben co., extends along the W. shore of Seneca lake, and terminates in Sodus bay on Lake Ontario. The conflicting claims of New York and New Hampshire led to violent collisions and almost to civil war. The threatened hostilities were averted in 1790 by the erection of the disputed territory into the state of Vermont, and the payment to New York of \$30,000. The seat of government was originally in New York city. The first constitution, adopted in March, 1777, was published at Kingston. In October of that year the public records were removed to Rochester, Ulster co., soon after to Poughkeepsie, and in 1784 to New York city. In 1797 Albany was made the capital. The constitution was revised in 1801, 1821, and 1846. Slavery, which had been much restricted since the formation of the first constitution, was abolished in 1817, though under the provisions of the act a few aged persons continued in nominal slavery many years later. At the close of the revolution a treaty was concluded with the Six Nations, by which a large amount of the Indian lands was ceded to the state. Settlements rapidly spread in the fertile regions of central New York, and by subsequent treaties all the lands of the Indians except a few "reservations" passed into the hands of the whites. During the war of 1812 the frontier settlements were constantly exposed to attacks of the British, and several serious en-

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NEW YORK CITY AND VICINITY.

gements took place along the borders. In 1796 the "Western Navigation Company" was incorporated, which built locks around the rapids on the Mohawk, and dug a canal across the portage at Rome, so that laden boats could pass from the ocean to Oneida lake, and thence by the outlet to Lake Ontario. In 1800 Gouverneur Morris conceived the plan of a canal directly through the state from east to west. In 1808 James Geddes made a partial survey of the proposed route, and reported favorably. De Witt Clinton investigated the matter, and from that time gave to the project the whole weight of his influence. The war of 1812 caused a suspension of the project, but in 1816 a law was passed authorizing the construction of the canal. Work was begun in 1817, and the canal was finished in 1825. It speedily became the great channel of trade and emigration. In 1853-'4 the constitution was amended in order to enable the state to borrow \$9,000,000 to facilitate the completion of the canals. In 1865 an amendment providing for the appointment of five commissioners of appeals was rejected. In 1866 a convention was called by popular vote for the revision of the constitution, in pursuance of its provision for the submission of that question every 20 years. The members were elected in April, 1867, met on June 4, and continued their sessions till Feb. 28, 1868; but at the election of Nov. 2, 1869, the new constitution was rejected, as well as several amendments which were submitted separately, excepting one reorganizing the judiciary. An amendment providing for the appointment instead of the election of the principal judges was rejected at the election of 1873. In November, 1874, several amendments which had been proposed by the legislature were ratified by the people. These removed the property qualification of colored voters, restricted the power of the legislature to pass private or local bills, made changes in the executive department, prescribed an oath of office in relation to bribery, established safeguards against official corruption, and removed the restrictions imposed upon the legislature in regard to selling or leasing certain of the state canals. During the civil war New York furnished to the federal army 455,568 troops, or 380,980 reduced to a three years' standard. In 1869 the legislature ratified the 15th amendment to the federal constitution; in 1870 this action was annulled by a resolution, which was rescinded in 1872.—The history of New York from 1609 to 1691 is given in Brodhead's "History of the State of New York" (2 vols. 8vo, 1853-'71). See also "History of New Netherland," by E. B. O'Callaghan (2 vols., New York, 1845-'8), and "Documentary History of New York" (4 vols. 4to, Albany, 1849-'51), and "Documents relative to the Colony of New York" (11 vols., 1855-'61), both edited by him. The geological and natural history survey of the state was made in 1836-'42, the results of which have been published in elaborate reports, viz.:

zoölogy, by De Kay, 5 vols.; botany, by J. Torrey, 2 vols.; mineralogy, by L. C. Beck, 1 vol.; geology, by W. W. Mather, E. Emmons, L. Vanuxem, and J. Hall, 4 vols.; agriculture, by E. Emmons, 5 vols.; palæontology, by J. Hall, 4 vols. (See supplement.)

NEW YORK, a city of the state of New York, coextensive with the county of the same name, the commercial metropolis of the United States, and the most populous city in the western hemisphere, situated at the mouth of the Hudson river, about 145 m. below Albany, 18 m. from the Atlantic ocean, 190 m. in a direct line S. W. of Boston, 205 m. N. E. of Washington, and 715 m. E. of Chicago; lat. of the city hall, 40° 42' 43" N., lon. 74° 0' 3" W. The main body of the city is situated on Manhattan island; besides which it includes Randall's, Ward's, and Blackwell's islands in the East river; Governor's, Bedloe's, and Ellis islands in the bay, occupied by the United States government; and a portion of the mainland N. of Manhattan island, and separated from it by Spuyten Duyvel creek and Harlem river. It is bounded N. by the city of Yonkers; E. by the Bronx river, which separates it from the towns of East Chester and West Chester, Westchester co., and by the East river, separating it from Long island; S. by the bay; and W. by the Hudson or North river, which separates it from New Jersey. Its extreme length N. from the Battery is 16 m.; greatest width, from the mouth of Bronx river W. to the Hudson, 4½ m.; area, nearly 41½ sq. m. or 26,500 acres, of which 19 sq. m. or 12,100 acres are on the mainland. Manhattan island is 13½ m. long, and varies in breadth from a few hundred yards at the Battery to 2½ m. at 14th street, diminishing again to less than 1 m. above 130th street, and having an area of nearly 22 sq. m. or 14,000 acres. The East river islands comprise about 300 acres, and those in the bay 100 more. Manhattan island is bounded N. by Spuyten Duyvel creek and Harlem river, which separate it from the mainland of the state, E. by the East river, S. by the bay, and W. by the Hudson river. The island was originally very rough, a rocky ridge running from the S. point northward, and branching into several spurs, which united after 4 or 5 m., culminating in Washington heights, 238 ft. above tide water, and a bold promontory of 130 ft. at the extreme N. point. The S. portion of the island and the shores in some places were alluvial sand beds, while marshes and ponds also occurred. But the original character of the surface has disappeared in the lower portion, and is disappearing in the upper, before the constant grading and filling for the construction of new or the improvement of old streets. One of the largest bodies of water was the "Collect pond," nearly 2 m. in circumference and 50 ft. deep, which covered the site of the "Tombs" and adjacent territory, and was connected with marshes on the Hudson by a rivulet on the line of Canal street, which takes its name from this circumstance. The

lower part of the island has been considerably widened by filling in the rivers on either side. Several localities in the upper portion are popularly known by different names. Yorkville and Harlem are on the E. side, the former in the vicinity of 86th street, and the latter of 125th street. On the W. side are Bloomingdale and Manhattanville, opposite Yorkville and Harlem respectively. Above Manhattanville and in the vicinity of 150th street is Carmansville, about $1\frac{1}{2}$ m. further up Fort Washington or Washington Heights, and at the N. W. extremity of the island Inwood. The mainland portion of the city, formerly constituting the towns of Morrisania, West Farms, and Kingsbridge, Westchester co., was annexed by the act of May 23, 1873, which went into effect on Jan. 1, 1874. The S. portion, comprising Morrisania and a part of West Farms, forms the 23d ward of the city, the rest of West Farms with Kingsbridge constituting the 24th ward. The 23d ward contains several villages, with various popular designations, among which are Mott Haven and North New York, immediately across Harlem bridge; Port Morris, on the East river; and Melrose, Woodstock, Morrisania, Highbridgeville, and Claremont, further N. In the 24th ward are Tremont, Mount Hope, Mount Eden, Fairmount, West Farms, Belmont, Fordham, and Williamsbridge, between the Harlem and Bronx rivers; Kingsbridgeville and Spuyten Duyvel, separated from the N. extremity of Manhattan island by Spuyten Duyvel creek; Mosholu, N. of these; and Riverdale and Mount St. Vincent, on the Hudson. The surface of the new wards is diversified, the greater portion of the land being high and rolling, except in the south, where it is low, and along the shores marshy. The district is traversed by several small sluggish streams, having a S. course, the principal of which are Tibbett's brook, emptying into Spuyten Duyvel creek; Cromwell's creek, discharging into Harlem river at Macomb's Dam bridge; and Mill brook and Leggett's creek, in the southeast. Between the streams the land rises for the most part to from 100 to 280 ft. above tide water, the highest point being on the Riverdale ridge between Tibbett's brook and the Hudson. These ridges are well improved and occupied by country residences. The former town of Morrisania is thickly settled, and is regularly laid out with avenues running N. and S., and streets crossing them at right angles numbered in continuation of those on Manhattan island. It is divided into two nearly equal parts by 3d avenue, continued across Harlem bridge. The rest of the new district is not regularly laid out, though the S. and W. portions of the 24th ward are well provided with streets and avenues, each village having its own system. This new part of the city is to be regulated under the direction of the park commissioners, and the work is now in progress (1875). The two portions of the city are connected by four wagon and two railroad bridges across Harlem river

and Spuyten Duyvel creek. Harlem bridge, at 3d avenue and 130th street, is of iron; Macomb's Dam bridge, near 7th avenue and 154th street, and Farmer's and King's bridges, near the N. extremity of the island, are of wood. One of the railroad bridges crosses Spuyten Duyvel creek at its entrance into the Hudson, and is used by one branch of the Hudson River railroad; the other crosses Harlem river a little N. of Harlem bridge, and is used by the other railroad lines that enter the city. A suspension bridge across the upper part of the Harlem, and a tunnel under it, at 7th avenue, are proposed.—On Manhattan island, the older portion of the city below 14th street ($2\frac{1}{2}$ m. from the Battery) is for the most part somewhat irregularly laid out. The plan of the upper portion embraces avenues running N. to the boundary of the island, and streets crossing them at right angles from river to river. The avenues are numbered from the east to 12th avenue; E. of 1st avenue in the widest part of the city are avenues A, B, C, and D. Above 21st street, between 3d and 4th avenues, is Lexington avenue, and above 23d street, between 4th and 5th avenues, Madison avenue; 6th and 7th avenues are intercepted by Central park. The avenues are 100 ft. wide, except A and C, which are 80 ft.; Lexington and Madison, 75 ft.; and B and D, 60 ft. Fourth avenue above 34th street is 140 ft. wide, and between 34th and 40th streets (here called Park avenue) it is divided in the centre by a row of beautiful little parks, surrounding the openings of the railroad tunnel. The streets are 60 ft. wide, except 15 of them, which are 100 ft., and are numbered consecutively N. to 225th street at Spuyten Duyvel creek (1st street being $1\frac{1}{4}$ m. from the Battery); 20 blocks, including the streets, average a mile. The numbers on the avenues run N.; the street numbers run E. and W. from 5th avenue. Between 5th and 6th avenues they range from 1 toward 100 W. (14th street for instance), and between 5th and 4th avenues from 1 toward 100 E. (14th street); crossing 6th or 4th avenue, the numbers commence at 100, and as each avenue is crossed toward the east or west a new hundred is commenced, the number of a building thus indicating the block in which it is situated. The city is compactly built to Central park, about 5 m. from the Battery, and on the E. side for the most part to Harlem, $3\frac{1}{2}$ m. further. The W. side is sparsely occupied by cottages and shanties, with many market gardens, to Manhattanville, where and at Carmansville are compact villages. At Fort Washington and above it are many country residences. Broadway, the great central thoroughfare, is 80 ft. wide, and upon it are most of the principal hotels, banks, insurance offices, and great retail stores. It runs N. from the Battery, bending toward the west above 10th street, and, after crossing 5th, 6th, and 7th avenues, terminates at 59th street and 8th avenue. On the E. side the principal thoroughfare is the Bowery, a wide street, with its con-

tinuation 3d avenue; and on the W. side, Hudson street and 8th avenue. Fifth avenue contains many handsome churches, but is chiefly noted for the magnificence of its residences, to which it is almost exclusively devoted. The most favorite drives outside of Central park are the Boulevard, St. Nicholas avenue, and 6th and 7th avenues above the park. The Boulevard commences at 59th street and 8th avenue, and terminates at 155th street, following for the most part the line of the old Bloomingdale road, the continuation of Broadway, and coinciding above 107th street with 11th avenue; it is 150 ft. wide, and below 128th street is divided in the centre by a series of little parks. St. Nicholas avenue, 100 ft. wide, runs diagonally along the former Harlem lane from the upper side of Central park at 6th avenue and 110th street to 155th street, whence its continuation is the Kingsbridge road. Wall street, less than half a mile long, running from the lower part of Broadway to the East river, is the money centre of the country. It contains the custom house, United States sub-treasury and assay office, and many of the principal banks and banking houses. In Broad street near Wall are the stock exchange and gold room.—Many of the buildings in the lower portion of the city and along Broadway below 34th street extend from street to street, or to the centre of the block, covering the entire ground space, from five to seven stories high, besides two stories below the surface, with well lighted vaults reaching nearly to the middle of the street. The most common materials here are granite, marble, and other varieties of stone, with iron in many recent structures. Brick is still much used in the cheaper class of dwellings and workshops. The finest residences are of brown stone, four stories high, 5th and Madison avenues and the adjacent streets being lined with stately edifices of this class. The mansion of A. T. Stewart, at the corner of 5th avenue and 34th street, of white marble, three stories high besides basement and Mansard roof, and containing a fine gallery of paintings, is the most splendid residence in the city. Many of the banks, insurance buildings, and other business structures are of palatial size and magnificence. The Drexel building, on the corner of Wall and Broad streets, is seven stories high, built of white marble in the renaissance style. The Bennett building, in Nassau street between Fulton and Ann, is of iron and seven stories high. The publishing house of Harper and brothers is a prominent structure with an iron front in Pearl street. In Broadway, on the corner of Cedar street, is the building of the Equitable life insurance company, having a frontage of 87 ft., a depth of 200, and a height of 137. Above this, on the corner of Liberty street, is the six-story building of the mutual life insurance company, surmounted by a tower containing a clock; and on the corner of Fulton street, the new "Evening Post" building. Further up and adjoining each other, between

Fulton and Ann streets, are the Park bank and the "Herald" building, both of marble. On the other side of Broadway, at the corner of Dey street, is the new building of the Western Union telegraph company, ten stories high (including three in the roof), with a clock tower; the two lower stories are of granite, the others of brick trimmed with granite. The height of the main wall is 140 ft. from the ground, and of the platform at the top of the tower 230 ft. In Printing House square, E. of the City Hall park, the "Times" and "World" buildings (occupying the former site of the Brick church), the new granite building of the *Staats-Zeitung*, with statues of Gutenberg and Franklin above the portal, and the new "Tribune" building (corner of Spruce street), of brick and granite, nine stories high with a lofty tower, are particularly noticeable. The New York life insurance company's building, on the corner of Broadway and Leonard street, is of white marble in the Ionic style; and opposite is the magnificent building of the Globe mutual life insurance company. A little above this is the Ninth national bank, also a superb structure. The retail store of A. T. Stewart and co. is of iron, five stories high, and occupies the entire block between 9th and 10th streets and Broadway and 4th avenue. The Methodist publishing and mission building, on the corner of Broadway and 11th street, is also of iron, five stories high with a spacious basement. On the corner of Broadway and 14th street is the six-story iron building of the Domestic sewing machine company, and on the corner of Broadway and 20th street Lord and Taylor's store, which has a frontage of 110 ft., a depth of 128, and a height of 122. There are many other business structures scarcely less worthy of mention.—Among the public buildings is the city hall, in the park, 216 by 105 ft., and three stories high; it is a handsome edifice of the Italian style. The front and ends are of white marble, and the rear of brown stone. It was erected from 1803 to 1812, at a cost of more than \$500,000, and is occupied by the mayor, common council, and other public officers. The "governor's room" in the second story contains the writing desk on which Washington penned his first message to congress, the chairs used by the first congress, the chair in which Washington was inaugurated first president, and a gallery of paintings embracing portraits of the mayors of the city, state governors, and leading federal officers and revolutionary chieftains, mostly by eminent artists. It has also a very fine portrait of Columbus. The building is surmounted by a cupola containing a four-dial clock, which is illuminated at night by gas. In the rear of the city hall and fronting on Chambers street is the new court house, which was commenced in 1861, and has been occupied since 1867, but is not completed. It is of Corinthian architecture, three stories high, 250 ft. long by 150 ft. wide, and the crown of the dome is to be 210 ft.

above the sidewalk. The walls are of Massachusetts white marble; the beams, staircases, &c., are of iron; while black walnut and choice

and Park row. The walls are of Dix island granite, four stories high, besides the Mansard roof. Its cost is between \$6,000,000 and

\$7,000,000. The sub-treasury, formerly the custom house, occupies the site of the old Federal hall on the corner of Wall and Nassau streets, and extends through to Pine street. It is of white marble, entirely fire-proof, 200 ft. by 90, and 80 ft. high, with Doric porticoes of eight columns on Wall and Pine streets, and a granite roof. The rotunda is 60 ft. in diameter, and the dome is supported by 16 Corinthian columns. Its cost was \$1,175,000. The custom house, formerly the merchants' exchange, also in Wall street, on the corner of William street, is 200 by about 160 ft., and 77 ft. high. It is of Quincy granite, with a portico having 12 front, 4 middle, and 2 rear columns, each of granite, 38 ft. high and $4\frac{1}{2}$ ft. in diameter. The rotunda is 80 ft. high, and the dome is supported on eight pilasters of fine



New Post Office.

Georgia pine are employed in finishing the interior. The halls are covered with marble tiling. The main entrance on Chambers street is reached by a flight of 30 broad steps, which are ornamented with marble columns. E. of the court house, in the N. E. corner of the park, are two substantial brown-stone buildings, the larger occupied by courts and offices, and the smaller as an engine and court house. S. of these, E. of the city hall, is the hall of records, a massive stone edifice, once a prison, but now occupied by the registry of deeds. The old post office building (formerly the Middle Dutch church) is in Nassau street. The new building for the post office and United States courts occupies the S. extremity of the City Hall park. It is of Doric and renaissance architecture, with several Louvre domes, and has a front of 279 ft. toward the park and of 144 ft. toward the south, with two equal façades of $262\frac{1}{2}$ ft. on Broadway

Italian variegated marble. The cost of the building and ground was \$1,800,000. It is inadequate and inconvenient for its present use,



Custom House.

and the erection of a new custom house has been strongly urged. The police headquarters is in Mulberry street, between Bleecker and

Houston, running through to Mott street. It is built of white marble, and is 70 ft. wide by 187 deep, and five stories high. The "Tombs" or city prison, constructed of gran-

ite in the Egyptian style, occupies the block bounded by Centre, Elm, Franklin, and Leonard streets, and is 200 by 253 ft. In front are police court rooms. In the area within



Interior of Grand Central Depot.

executions take place. The Grand Central depot, in 42d street, between 4th and Madison avenues, is built of brick, stone, and iron, and cost nearly \$2,250,000. It is 240 ft. on 42d street by 692 ft. toward Madison avenue, and is surmounted by several Louvre domes. It covers $66\frac{1}{2}$ city lots, and, besides containing waiting and baggage rooms and offices, admits 150 cars. It is the largest and finest depot in the country, and is used by most passenger trains of the New York Central and Hudson River railroad, and by the New York and Harlem and the New York and New Haven railroads. The freight depot of the Hudson River railroad, constructed of brick, granite, and iron, and three stories high, occupies the entire square (formerly St. John's park) bounded by Hudson, Beach, Varick, and Laight streets. On the Hudson street front is a bronze statue of Cornelius Vanderbilt, surrounded by emblematic designs, also in bronze. Odd Fellows' hall, on the corner of Grand and Centre streets, is a large, substantially built, brown-stone building, surmounted by a dome. It contains a series of highly ornamented lodge rooms, richly furnished, and in different styles of architecture, Egyptian, Grecian, Elizabethan, &c. The masonic temple, of granite, five stories high, on the corner of 23d street and 6th avenue, is 100 by 140 ft.,

with a dome 50 ft. square rising 155 ft. above the pavement. The grand lodge hall, 84 by 90 ft. and 30 ft. high, will seat 1,200 persons.—The oldest church edifice, until it was



Masonic Temple.

torn down in 1875, was the North Dutch, in William street, between Fulton and Ann, erected in 1769. Trinity, in Broadway opposite Wall street, is in the Gothic style, built

of brown stone, 192 ft. long, 80 broad, and 60 high, with a spire 284 ft. high. It has rich stained windows and a good chime of bells.



Trinity Church.

The first edifice was destroyed by fire in 1776, and a new one was erected in 1788; the present edifice was commenced in 1839 and consecrated in 1846. It is open every day. The spire commands a magnificent view. St. Paul's, also in Broadway, is 151 by 73 ft., and has a spire 203 ft. high; the front and rear are of brown stone, and the sides of gray stone colored to match; the pediment contains a white marble statue of St. Paul, and below is the monument of Gen. Richard Montgomery. St. Mark's, in Stuyvesant street, contains in a vault the remains of Gov. Stuyvesant. St. George's, in Stuyvesant square, is 170 by 94 ft., with double spires; it is in the Byzantine style, and is one of the most capacious churches in the city. Grace church, in Broadway near 10th street, is of white freestone, and the interior is exceedingly elaborate with carved work and stained glass. Trinity chapel, in 25th street, 180 by 54 ft., has an interior of Caen stone, with a blue ceiling, rich stained

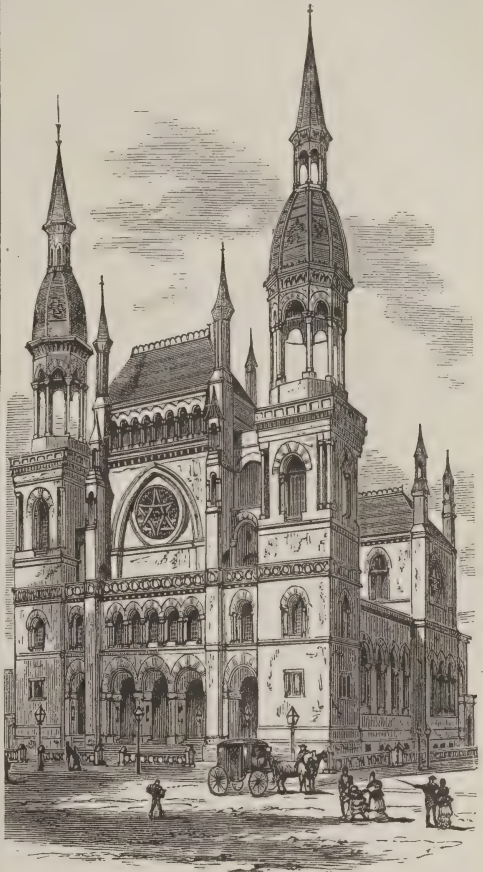
windows, tiled floor, and movable seats. All the above named churches are Episcopal. St. Peter's Catholic church, in Barclay street, is a

massive granite building, with an Ionic portico and six granite columns, with a statue of St. Peter. St. Matthew's Lutheran church (originally the first Baptist church), in Broome street, corner of Elizabeth, is of blue stone with battlements of brown stone in the Gothic style, 99 by 75 ft. The Reformed (Dutch) church in Lafayette place, corner of 4th street, is a massive plain building, 110 by 75 ft., with a conical spire. The Washington square Reformed (Dutch) church is a Gothic building of rough granite, with square towers. The Roman Catholic church of the Holy Redeemer, in 3d street, is very large and costly, and richly decorated inside with marble columns and a magnificent altar. The first Presbyterian church, in 5th avenue corner of 11th street, is 119 by 80 ft., and has a spire 160 ft. high. The Presbyterian church in 10th

street and University place, of reddish stone, is a Gothic building, 116 by 65 ft., with a spire of 184 ft. The Madison square Presbyterian church is another elegant building. St. Paul's M. E. church, in 4th avenue, is Romanesque, of white marble, 146 by 77 ft.; the spire is 210 ft. high. Calvary Episcopal church, in 4th avenue and 21st street, is a large and handsome edifice of brown stone, with double towers. On the corner below is the Unitarian church of All Souls, of red brick and cream-colored stone in alternate layers, with variegated marble door columns. The free Episcopal church of the Holy Communion, in 6th avenue and 20th street, is of sandstone, cruciform in plan, 104 by 66 ft., with a turret 70 ft. high. The Congregational church (Broadway Tabernacle) in 34th street and 6th avenue is a fine Gothic edifice, with elaborate ornamentation. The Reformed (Dutch) church in 5th avenue, on the corner of 29th street, is an elegant white marble building, with a

tall spire of the same material. The fourth Universalist church, in 5th avenue on the corner of 45th street, is in the Gothic style. The main building is 100 by 80 ft., and 90 ft. high. The front is 95 ft., and the towers are 185 ft. The "Brick" church (Presbyterian), in 5th avenue on the corner of 37th street, is a spacious brick edifice, with a lofty spire. The first Baptist church, in Park avenue on the corner of 39th street, is a capacious and handsome edifice. Other noteworthy church edifices are the Reformed (Dutch) church on the corner of 5th avenue and 48th street; St. Thomas's (Episcopal), on the corner of 5th avenue and 53d street; the Fifth avenue Presbyterian church, on the corner of 55th street; the Madison avenue Reformed (Dutch) church, on the corner of 57th street, with a spire 188 ft. high; the Presbyterian memorial church, in Madison avenue, corner of 53d street; St. Bartholomew's (Episcopal), in Madison avenue, corner of 44th street; the church of the Holy Trinity (Episcopal), in Madison avenue, corner of 42d street; the church of the Covenant (Presbyterian), on the corner of Park avenue and 35th street; and the Unitarian church of the Messiah, in 34th street, on the corner of Park avenue. The Jewish temple Emanuel, in 5th avenue on the corner of 43d street, is the finest speci-

the city, and one of the largest and finest on the continent, is St. Patrick's cathedral (Catholic), in 5th avenue between 50th and 51st



Temple Emanuel.

streets, commenced in 1858 and still in progress. It is constructed of white marble in the decorated Gothic style, and is 332 ft. long, with a general breadth of 132, and at the transept of 174 ft. At the front are to be two spires, each 328 ft. high, flanking a central gable 156 ft. high.—There are 30 public parks and triangular spaces, with few exceptions adorned with trees, flowers, and grass plots, and mostly enclosed with substantial iron fences. The Battery, at the S. extremity of the city, looking out upon the bay, so called from having been the site of an early fortification, was at one time the fashionable resort of the citizens, and was surrounded by the residences of the wealthy. It subsequently fell into neglect, but within a few years it has been enlarged, protected by a substantial sea wall, and beautifully laid out. It embraces 21 acres. The Bowling Green, so called from its use prior to the revolution, is just above the Battery at



Reformed (Dutch) Church, 5th avenue and 48th street.

men of Saracenic architecture in America; the interior is magnificently decorated in the oriental style. The largest church edifice in

the foot of Broadway, and comprises half an acre. The City Hall park, fronting on Broadway, half a mile above the Battery, has an area of $8\frac{1}{4}$ acres, of which more than 2 acres are cov-

section of Broadway and 5th avenue, is a monument commemorating the achievements of Gen. Worth in the Mexican war. Gramercy park ($1\frac{1}{2}$ acre), between 20th and 21st streets



Roman Catholic Cathedral.

ered by buildings. In Printing House square, E. of the park, is a statue of Franklin. The principal other parks, besides Central and Mount Morris square, are Washington square (8 acres), between W. 4th street and Waverley place and Wooster and Macdougall streets, used as the city cemetery until 1832; Tompkins square ($10\frac{1}{2}$ acres), between avenue A and avenue B and 7th and 10th streets, used as a parade ground; Union square ($3\frac{1}{2}$ acres), between 14th and 17th streets and 4th avenue and Broadway; Stuyvesant park ($4\frac{1}{2}$ acres), between 15th and 17th streets, and divided by 2d avenue into two distinct parks; Madison square ($6\frac{1}{2}$ acres), between 23d and 26th streets and Madison and 5th avenues; and Reservoir square ($4\frac{1}{2}$ acres), E. of 6th avenue, between 40th and 42d streets, and separated from 5th avenue by the distributing reservoir. In Union square are a statue of Lincoln and an equestrian statue of Washington; and near Madison square, at the inter-

section of Broadway and 5th avenue, is a private ground, belonging to the surrounding property owners. Central park, the great park of the city and one of the largest and finest in the world, was laid out in 1858. It is situated between 59th and 110th streets and 5th and 8th avenues, and is $2\frac{1}{2}$ m. long by $\frac{1}{2}$ m. wide, embracing 843 acres, to which has recently been added Manhattan square (24 acres), which joins it on the west, lying between 8th and 9th avenues and 77th and 81st streets. Between 79th and 96th streets a large portion of the park is occupied by the two Croton reservoirs, the smaller one comprising 35 and the larger 107 acres. It has 18 entrances, 4 at each end and 5 on each side, and four streets (65th, 79th, 85th, and 97th) cross it, to afford opportunity for traffic, passing under the park walks and drives. The original surface was exceedingly rough and unattractive, consisting chiefly of rock and marsh. Art has overcome the natural defects, and the park now, with its fine trees, its beautiful flowers and shrubbery, its walks and drives, and numerous other attractions, is a delightful resort. It contains three artificial lakes, bridges, arches, and other architectural ornaments, buildings for various purposes, statuary, fountains, &c. The old arsenal, a three-story stone building, near the S. E. corner of the park, contains the collections of

the "American Museum of Natural History" and the meteorological observatory. In the same building and the surrounding cages is the menagerie of living animals, reptiles, and birds, presented or loaned to the city, comprising many rare specimens. A new building for the museum of natural history is (1875) nearly completed in Manhattan square; and another is in progress in the E. part of the park, near 82d street and 5th avenue, for the metropolitan museum of art, now in 14th street. These are to be erected by the park commissioners at the public cost. (See PARK.) Mount Morris square is situated on the line of 5th avenue between 120th and 124th streets, and embraces 20 acres. In the centre rises a rocky eminence to the height of 101 ft. above the sea and 80 ft. above the surrounding plain, commanding magnificent views. The level portion has been handsomely laid out, and walks have been made to the summit of the hill. Morn-

ingside park, embracing an irregular area of $47\frac{1}{2}$ acres E. of 10th avenue, between 110th and 123d streets; High Bridge park ($23\frac{1}{2}$ acres), at the approach to High bridge; and Riverside park ($177\cdot86$ acres), along the bank of the Hudson between 72d and 129th streets, are not yet laid out. Fleetwood park in the 23d ward, and Jerome park in the 24th, are favorite race courses. The Bowling Green, City Hall park, Washington square, Union square, Stuyvesant park, Gramercy park, Madison square, and some others contain fountains. The public parks are under the control of four commissioners, of whom all except the president serve without pay.—The only cemetery now in use on Manhattan island is that of Trinity church, between 153d and 155th streets and 10th avenue and Hudson river. It comprises 25 acres tastefully laid out and well kept, and contains many fine tombs and monuments. Woodlawn cemetery is in the 24th ward, on the bank of the Bronx river near the N. boundary of the city. It is situated on a wooded ridge, comprises more than 300 acres, and was laid out in 1865. The grounds have been finely improved. The principal other cemeteries in use are the New York Bay cemetery, on the W. shore of the bay, $2\frac{1}{2}$ m. below Jersey City, and Greenwood, Cypress Hills, Evergreens, and Calvary, on Long island. (See BROOKLYN, vol. iii., p. 319.) Trinity churchyard contains a monument to the patriots who died in prison during the revolution, and St. Paul's one in memory of Thomas Addis Emmet. The cemetery in 2d street between 1st and 2d avenues also contains a number of monuments.—The climate of New York, tempered by its proximity to the ocean, is generally mild, though changeable; there is considerable hot weather in summer, and the cold in winter is occasionally severe. The meteorological observatory in Central park, organized in 1869, is provided with self-recording instruments invented by Daniel Draper,

the director, which register continuously the movements of the thermometer and barometer, the direction, force, and velocity of the wind, and the rainfall. The average monthly temperature and fall of rain and snow for the six years ending with 1874 have been as follows:

MONTHS.	Mean temperature.	Rainfall, inches.	Snowfall, inches.
January.....	32·06°	2·91	8·50
February.....	31·09	1·76	11·96
March.....	36·06	3·32	2·66
April.....	45·18	4·10	·75
May.....	59·67	3·12	.....
June.....	70·33	3·54	.....
July.....	74·75	5·00	.....
August.....	73·07	4·90	.....
September.....	67·15	3·67	.....
October.....	54·55	4·46	.....
November.....	41·00	3·02	·96
December.....	32·51	1·76	9·72
Year.....	51·58	41·56	34·55

The maximum temperature during the period was 98° above zero, and the minimum 2° below zero. The average number of rainy days per year was $112\frac{1}{2}$; of snowy days, 19. The average duration of rain storms per year was 29d. 6h. 32m.; of snow storms, 5d. 23h. 20m.—The growth of the city has been extremely rapid, the population according to different colonial, state, and federal censuses having been as follows:

YEARS.	Population.	YEARS.	Population.	YEARS.	Population.
1656....	1,000	1800....	60,489	1840....	312,710
1664....	1,500	1805....	75,770	1845....	371,223
1698....	4,937	1810....	96,373	1850....	515,547
1731....	8,622	1816....	93,684	1855....	629,810
1756....	18,046	1820....	123,706	1860....	805,658
1771....	21,862	1825....	166,086	1865....	726,386
1786....	28,614	1830....	202,589	1870....	942,292
1790....	33,131	1855....	268,089	.....	.....

The figures for 1870 include 13,072 colored persons, 12 Chinese, and 9 Indians. The following facts are taken from the census of 1870:

WARDS.	Total population.	Native born.	Foreign born.	Number attending school during the year.	Persons 10 years old and upward unable to read.	Number of families.	Persons to a family.	Number of dwellings.	Persons to a dwelling.
1st.....	14,463	6,441	8,022	2,833	1,748	2,876	5·03	687	21·05
2d.....	1,312	651	661	123	85	136	9·65	733	1·79
3d.....	8,715	1,752	1,963	521	75	609	6·10	425	8·63
4th.....	23,748	10,456	13,292	4,216	1,906	4,991	4·76	965	24·61
5th.....	17,150	9,245	7,905	2,527	1,144	3,571	4·80	1,289	13·30
6th.....	21,153	9,444	11,709	4,099	4,229	4,487	4·71	968	21·52
7th.....	44,818	24,130	20,683	7,820	2,999	8,974	4·99	2,388	18·61
8th.....	34,913	20,285	14,628	5,204	1,473	7,401	4·72	2,560	13·64
9th.....	47,609	33,020	14,589	7,451	1,175	9,366	5·08	3,917	12·15
10th.....	41,431	18,851	22,580	6,364	848	9,291	4·46	1,892	21·90
11th.....	64,230	34,805	29,425	13,129	1,713	14,473	4·44	3,086	20·51
12th.....	47,497	30,888	16,609	11,578	2,093	7,936	5·99	5,796	8·19
13th.....	33,364	19,288	14,076	5,579	1,244	7,061	4·73	1,677	19·90
14th.....	26,436	13,879	13,057	4,964	3,601	5,740	4·61	1,471	17·97
15th.....	27,587	16,821	10,766	8,104	1,293	4,656	5·88	2,866	11·66
16th.....	48,359	29,510	18,849	6,911	1,456	8,955	5·40	3,808	12·70
17th.....	95,365	46,083	49,332	16,664	2,105	21,320	4·47	3,966	24·05
18th.....	59,593	32,318	27,275	7,186	2,158	11,156	5·34	3,919	15·21
19th.....	86,090	48,125	37,965	12,650	2,140	13,873	6·21	6,695	12·86
20th.....	75,407	42,660	32,747	12,468	4,092	15,846	4·76	5,048	14·94
21st.....	56,703	33,402	23,301	7,879	2,454	9,432	6·01	4,252	13·84
22d.....	71,349	46,694	29,655	12,333	3,075	13,604	5·24	6,123	17·65
City.....	942,292	523,198	419,094	155,603	43,056	185,789	5·07	64,044	14·72

Of the natives, 484,109 were born in New York, 8,061 in New Jersey, 5,995 in Massachusetts, 5,140 in Connecticut, 5,099 in Pennsylvania, 2,073 in Virginia and West Virginia, 2,028 in Maryland, 1,235 in Ohio, and 1,224 in Maine; and there were living in the city persons born in every other state and in several of the territories. The foreigners embrace 234,594 natives of the British isles (including 201,999 Irish, 24,442 English, 7,562 Scotch, and 584 Welsh), 151,216 of Germany, 8,265 of France, 4,419 of British America, 2,794 of Italy, 2,737 of Austria (exclusive of Hungary and Bohemia), 2,612 of Scandinavia (including 1,558 Swedes, 682 Danes, and 372 Norwegians), 2,393 of Poland, 2,178 of Switzerland, 1,487 of Bohemia, 1,294 of Cuba, 1,237 of Holland, 1,151 of Russia, 521 of Hungary, 489 of the West Indies (exclusive of Cuba), 453 of Spain, 325 of Belgium, 211 of South America, and 717 of about 20 other countries. There were 457,117 male and 485,175 female inhabitants; 250,353 (122,626 males and 127,727 females) between the ages of 5 and 18; 213,937 males between 18 and 45; 249,990 males 21 years old and upward, of whom 188,276 were citizens of the United States and 61,714 unnaturalized foreigners. Of those attending school, 141,677 were native and 13,926 foreign born, 77,867 males and 77,736 females. There were 62,238 persons 10 years old and upward unable to write, of whom 8,447 were native and 53,791 foreign born, 18,905 males, and 43,333 females; 3,894 between 10 and 15 years of age, 4,423 between 15 and 21, and 53,921 (15,711 males and 38,210 females) 21 and upward. Of the 350,556 persons 10 years old and upward returned as engaged in all occupations, 264,385 were males and 86,171 females, and 8,456 were between 10 and 15 years of age. There were employed in agriculture, 1,401; in professional and personal services, 115,259, including 2,549 barbers and hairdressers, 1,535 boarding and lodging house keepers, 715 clergymen, 49,440 domestic servants, 4,832 hotel and restaurant keepers and employees, 316 journalists, 28,451 laborers, 5,604 laundresses and laundresses, 1,283 lawyers, 1,278 livery stable keepers and hostlers, 4,222 government officials and employees, 1,741 physicians and surgeons, and 3,511 teachers; in trade and transportation, 88,611, including 23,872 traders and dealers, 4,744 bucksters, peddlers, and commercial travellers, 27,590 clerks, salesmen, and accountants, 2,625 engaged in banking and brokerage of money and stocks, 730 in insurance, 924 officials and employees of express companies, 2,003 of railroad companies, 917 of street railroad companies, 298 of telegraph companies, 9,813 carmen, draymen, teamsters, &c., and 4,463 sailors, steamboatmen, &c.; in manufactures, 145,285 including 3,855 bakers, 3,533 blacksmiths, 2,276 bookbinders and finishers, 6,960 boot and shoe makers, 6,586 masons and stone cutters, 4,870 butchers, 5,071 cabinet makers and upholsterers, 10,427 carpenters and

joiners, 5,550 cigar makers, &c., 1,101 confectioners, 1,606 coopers, 1,477 cotton and woolen mill operatives, 1,744 hat and cap makers, 2,296 iron and steel workers, 3,787 machinists, 9,747 milliners, dress and mantua makers, 5,824 painters and varnishers, 1,432 plasterers, 2,584 plumbers and gas fitters, 5,134 printers, 1,353 ship riggers, carpenters, &c., 18,564 tailors, tailoresses, and seamstresses, and 1,562 tanners. New York averages more than twice as many persons as Philadelphia to a dwelling, and 4-76 more than Fall River, Mass., which comes next to it in this respect among the cities of the Union. The peculiar shape of Manhattan island and the difficulty of transit between its extremities have tended to crowd the population into tenement houses in the lower portion, some parts of which rival the most crowded quarters of any other civilized city. The four most thickly inhabited districts of New York and London compare as follows:

NEW YORK.		LONDON.	
Wards.	Number of inhabitants to the acre.	Districts.	Number of inhabitants to the acre.
Tenth.....	877	Strand	307
Eleventh.....	828	East London.....	266
Thirteenth.....	812	St. Luke's.....	259
Seventeenth.....	288	Holborn.....	229

There are about 24,000 tenement houses (containing three or more families living independently). The average transient population has been estimated at 30,000. Since the census the annexation of Morrisania (pop. in 1870, 19,609), West Farms (9,372), and Kingsbridge (about 2,500) has added 31,481 inhabitants, making the population in 1870 within the present limits of the city 973,773. If we apply the ratio of increase that prevailed between 1860 and 1870, the present population (1875) will be about 1,050,000. These figures, confined to the corporate limits of the city, do not give an adequate idea of New York as a business centre. Thousands of people doing business here reside beyond the city limits, coming and going every morning and evening, while Brooklyn, Jersey City, and other neighboring communities are directly dependent upon and practically parts of New York. The country within a radius of 20 m. from the city hall (embracing the S. portion of Westchester co., Kings and the greater part of Queens co., on Long island, Staten island, and Union, Hudson, Essex, and a portion of Passaic and Bergen cos., N. J.) would add, according to the census of 1870, about 925,000 inhabitants (375,000 from New Jersey and 550,000 from New York), and would raise the present population of the metropolis to more than 2,000,000, of whom 1,800,000 reside within 10 m. of the city hall. The circle thus described would include some not properly in the category, but would exclude probably an equal number that should be included.—The hotels of New York are

among the largest and finest in the world. Chief among them are the Brevort, Everett, Gilsey, and Hoffman houses, and the Brunswick, Clarendon, Fifth Avenue, Grand, Grand Central, Metropolitan, New York, St. Cloud, St. Denis, St. James, St. Nicholas, Union Square, Westminster, Westmoreland, and Windsor hotels; and of more than 75 other large hotels, several are not much inferior to those named. The Astor house, a massive five-story granite building in Broadway opposite the new post office, the front occupying an entire block, was long a leading hotel, accommodating about 600 guests. It was built by John Jacob Astor, and was opened in 1836. It is now (1875) undergoing alterations for the purpose of adapting the two lower stories to business purposes. The first story was always occupied by stores. The St. Nicholas, opened in 1854, is six stories high, fronting about 275 ft. on Broadway and 200 on Spring street, built of white marble and brown freestone, and has 600 rooms with accommodations for 1,000 guests. It is luxuriously furnished throughout. The Metropolitan fronts 278 ft. on Broadway, with a wing on Prince street 200 by 25 ft. The main building is about 60 ft. deep, six stories high, all of brown freestone. This also is elegantly furnished. The Grand Central hotel is in Broadway between Amity and Bleecker streets, extending through to Mercer street. It is constructed of brick and marble, is eight stories high, and covers 14 full lots. It is magnificently furnished. The building has a frontage of 175 ft., a depth of 200 ft., and is 127 ft. high to the cornice, which is surmounted by a Mansard roof. One of the most expensive and luxurious is the Fifth Avenue hotel, at the junction of Broadway, 5th avenue, and 23d street, opposite Madison square. It is of white marble, six stories high, fronting on three streets, and having room for nearly 1,000 guests. The Windsor hotel, the most recent, is a large and elegant brick structure, seven stories high, the front occupying the entire block on 5th avenue between 46th and 47th streets. In the magnificence of its appointments it is unsurpassed. The Buckingham hotel, in 50th street at the corner of 5th avenue, of brick trimmed with brown stone and seven stories high, is to be opened in the summer of 1875. Some of the hotels are conducted on the European plan, guests hiring rooms, and procuring meals at the restaurant of the hotel or elsewhere; others are kept on the American or full-board plan. Nowhere is the habit of eating away from home so general as in New York, owing to the great distance between residences and places of business; and this habit has made eating houses, lunch rooms, oyster saloons, bar rooms, &c., a prominent feature of the town. They are everywhere, open day and night, and thronged by all classes, according to their quality. The most fashionable restaurant is that of Delmonico in 5th avenue and 14th street.—Horse cars traverse the prin-

cipal avenues, and there are several lines running across town from river to river. Lines of omnibuses also run to and from the principal Brooklyn ferries along Broadway and 5th avenue and some other streets. These means of conveyance, however, but inadequately accommodate citizens residing in the upper part of the city. Various projects of more rapid transit, both by underground and elevated railways, have been discussed, but the problem is still unsolved. At the close of 1874 there were 16 horse railroad companies in operation, and one line (the New York Elevated railroad) run by steam, having an aggregate paid-in capital of \$15,107,670; funded and floating debt, \$11,093,057 55; cost of road and equipments, \$24,816,820 97; length of road laid, 132·93 m.; number of cars, 1,403; number of horses, 10,688; number of passengers carried during the year, 151,925,632; cost of operating road and for repairs, \$6,683,139 42; earnings, \$8,449,825 64; number of persons killed, 26; number injured, 68. The eight principal lines, with the number of passengers carried by each, are: Third Avenue, 26,588,000; Broadway and Seventh Avenue (University Place), 19,065,584; Eighth Avenue, 16,100,354; Dry Dock, East Broadway, and Battery, 15,850,345; Sixth Avenue, 15,050,426; Central Park, North and East River, 14,276,767; Second Avenue, 14,032,275; Fourth Avenue, 9,720,697. The last named line, opened in 1832, is a branch of the New York and Harlem railroad. It was the first street horse railroad ever constructed, and was not imitated till 1852, when the Sixth Avenue railroad was opened. One of the 17 lines runs from Harlem bridge to Fordham and West Farms; the others are on Manhattan island. The Elevated railroad runs along Greenwich street and 9th avenue from near the Battery to 34th street. The track is supported by iron posts about 16 ft. high, and the cars are drawn by dummy engines. The fare on the horse cars is commonly five cents and on the omnibuses ten cents. There are 15 steam ferries across East river, viz.: 12 to Brooklyn, 2 to Hunter's Point, and 1 to Astoria; 3 across the bay to Staten island; and 8 across North river, viz.: 5 to Jersey City, 2 to Hoboken, and 1 to Weehawken. These run every few minutes during the day, and some of them all night. Boats also ply to other neighboring points for the accommodation of passengers. An immense suspension bridge is in course of construction across the East river to Brooklyn. (See BRIDGE, and BROOKLYN.) New York has railroad communication with the east by means of the New York, New Haven, and Hartford line, and with the north and west by the New York and Harlem and the New York Central and Hudson River lines. The freight trains and some local passenger trains of the last named come in at the depot in 30th street and 9th avenue, whence the cars are drawn by dummy engines to the freight depot in St. John's park. Convenient and well arranged

cattle yards have been opened by this line, extending from 60th to 63d street, and from 11th avenue to the Hudson river. Other trains on the lines named arrive at the Grand Central depot, whence the freight cars of all except the Hudson River line are drawn by horses to the freight depot in Centre street, passing through the tunnel under 4th avenue from 40th to 33d street. Above the Grand Central depot the work of sinking the tracks is now (1875) in progress, so that the cars for the most part to Harlem river will pass through a tunnel under 4th avenue. Half the cost of this work is borne by the city, and half by the New York and Harlem railroad company. By ferry to Jersey City and Hoboken New York communicates with the Pennsylvania, Central of New Jersey, New Jersey Midland, Northern New Jersey, Erie, and Delaware, Lackawanna, and Western railroads for the south and west. The Morris canal terminates at Jersey City. The ferries to Hunter's Point and Brooklyn connect with the various railroads of Long island.—The harbor of New York is one of the finest in the world. The bar is at Sandy Hook, 18 m. from the city, and has two ship channels, from 21 to 32 ft. at low, and 27 to 39 ft. at high tide, admitting vessels of the heaviest draught, the Great Eastern having passed without danger or difficulty. The lower bay is a safe anchorage, of triangular form, from 9 to 12 m. on each side, the N. E. angle opening into the upper or New York bay, through the Narrows, a deep channel between Long and Staten islands, about $1\frac{1}{2}$ m. long by 1 m. wide. The upper bay is an irregular oval, about 8 by 5 m., opening northward into the Hudson river, eastward through the East river into Long Island sound, and westward into Newark bay. The rivers immediately around the city are deep, so that the heaviest ships can approach any of the wharves, while the bottom affords good anchorage, and the tidal currents keep the channels usually free from ice. The average rise and fall of the tide is 4·3 ft. The lower bay contains 88 sq. m. available for anchorage; the upper bay, 14 sq. m.; and the Hudson and East rivers, $13\frac{1}{2}$ sq. m. Vessels and steamers of light draught now pass to and from Long Island sound through the East river, but the obstructions at Hell Gate render navigation by large vessels dangerous. The operations in progress for the removal of these obstructions, under the auspices of the United States government, are expected to render the city accessible from the sound by sea-going vessels of the largest size. (See **BLASTING**.) The Harlem river, it is believed, may be improved at a reasonable cost, so as to admit small vessels. The fortifications consist of an unfinished fort at Sandy Hook and several works at the Narrows, in the bay, and at the entrance of East river into the sound. Fort Tompkins on the hill and Fort Wadsworth at the water's edge, with several batteries, are on the W. or Staten island side of the Narrows,

while on the E. or Long island side are Fort Hamilton and an exterior battery. Fort Lafayette, on a reef near the E. shore, noted as a place of detention for political prisoners during the civil war, is now useless. In the bay there are Fort Columbus, Castle Williams, and barbette batteries on Governor's island, Fort Wood on Bedloe's island, and Fort Gibson on Ellis island. Fort Schuyler is on Throgg's neck, on the N. side of the entrance to the sound; and on Willet's point, on the S. side, there is another fortification. The headquarters of the military division of the Atlantic are in W. Houston street on the corner of Greene. There is a navy yard at Brooklyn. The harbor is well provided with lights and beacons. A light ship is stationed off Sandy Hook, and on that point itself are several lighthouses. A prominent light is that on the Nevisink Highlands, S. of Sandy Hook. There are also lights on the E. shore of Staten island and on either side of the Narrows. At the entrance of the sound there is a lighthouse on Throgg's neck and two in the East river, one on North Brother island and the other on the N. point of Blackwell's island.—The shape and situation of Manhattan island are peculiarly favorable to the accommodation of shipping. It has $24\frac{1}{2}$ m. of available water front, viz.: 13 m. on Hudson river, $9\frac{1}{2}$ m. on East river, and $2\frac{1}{2}$ m. on Harlem river. Commerce is now mostly carried on below Grand street on East river and 11th street on Hudson river. There are about 70 piers on the former river, and about 80 on the latter. A plan for the improvement of the water front, below 61st street on Hudson river and below Grand street on the East river, has been adopted. A wall of béton or masonry or masonry alone is to be built so far outside of the present bulkhead as to afford room for a river street 250 ft. wide along the Hudson, and for the most part 200 ft. wide along East river below 31st street, above which the contemplated width is 175 ft. From this wall piers 500 or 600 ft. long are to be projected into the rivers. This plan will give on Hudson river, between the Battery and 61st street, a river-wall line of 25,743 ft. and a pier length of 37,529 ft., with a pier area of 3,325,600 sq. ft.; and on East river, between the Battery and 51st street, a river-wall line of 27,995 ft. and a pier length of 28,000 ft., with a pier area of 1,780,000 sq. ft. The total wharf line (piers and river walls) between W. 61st and E. 51st street would therefore be about 37 m., and between W. 11th street and Grand street on East river, 21·43 m. The piers are to be built mostly of preserved wood. The plan is being carried out as rapidly as practicable. The control of the water front is vested in three commissioners of docks. On the East river front facilities are afforded by dry docks and otherwise for repairing vessels of the largest class. New York has communication with the principal coastwise and transatlantic ports by numerous lines of

steamers. Besides the Hudson river and other local boats, there are more than 20 lines to various ports on the Atlantic and gulf coasts, owning 75 steamers, with an aggregate of 75,000 tons. To the West Indies and South America six lines despatch 25 steamers with an aggregate tonnage of 75,600. These include the Pacific Mail line, running *via* the isthmus of Panama to San Francisco, and a line to Rio de Janeiro. There are 12 lines of ocean steamers to British ports, with 105 ships of 310,460 tons, and 7 lines to continental ports, with 69 ships of 205,614 tons; total transatlantic lines, 18, with 174 ships of 516,074 tons. European steamers leave regularly on four days in the week: Tuesdays, Wednesdays, Thursdays, and Saturdays. The principal lines run to Antwerp, Bremen, Bristol, Cardiff, Glasgow, Hamburg, Havre, Liverpool (several), London, Newcastle-upon-Tyne, Rotterdam, and Stettin,

one or more of them touching at Bergen (Norway), Brest, Cherbourg, Copenhagen, Cork, Plymouth, Queenstown, and Southampton.—New York is preëminently a commercial city, ranking among the first in the world. More than half the foreign commerce of the United States is carried on through the customs district of which it is the port, and about two thirds of the duties are here collected, the whole amount for the year ending June 30, 1874, being \$160,522,284 63, of which \$109,549,797 79 was collected in the New York district. This district, besides the city, embraces the greater part of Long island, including Brooklyn; Staten island; the New Jersey shore N. of Staten island, including Jersey City; and the shores of Hudson river. The following table exhibits the growth of the foreign commerce of the district, and its percentage of that of the whole United States:

FISCAL YEARS.	Imports.	Percent- age.	Exports of foreign products.	Percent- age.	Domestic exports.	Percent- age.	Total foreign commerce.	Percent- age.
1821-'30 (average).....	\$36,337,956*	45½	\$8,797,218*	39	\$12,756,118*	24	\$57,921,292*	37
1831-'40 (average).....	75,392,170*	58	9,952,966*	50	18,005,852*	20	103,350,988*	43
1841-'50 (average).....	75,757,184*	59½	8,850,715*	64¼	30,181,578*	26¾	114,289,477*	45
1851-'5 (average).....	162,470,257*	64¼	15,563,924*	71	82,028,505*	37	260,062,986*	52½
1856-'60 (average).....	208,080,148	62½	12,657,925	53	102,257,675	31	322,995,748	47
1861.....	222,966,274	66½	13,311,495	64½	137,379,956	60	378,657,725	64
1862.....	142,215,636	69	10,402,084	61½	152,377,961	71½	304,995,681	70
1863.....	177,254,415	70	17,369,353	66½	221,917,978	72½	416,541,748	71
1864.....	229,506,499	69½	12,735,640	63	211,237,222	66	458,479,361	67½
1865.....	154,160,819	62	22,627,018	70½	219,369,873	67¾	396,157,710	65½
1866.....	302,505,719	65	7,458,845	50½	264,510,247	48	574,469,811	57
1867.....	277,469,510	66½	11,235,211	54½	267,382,457	47¾	496,087,178	56½
1868.....	242,580,659	65½	15,016,273	66½	236,031,239	52	493,627,171	57
1869.....	295,117,682	67½	17,741,886	70½	185,384,264	44½	498,248,782	58
1870.....	293,990,006	63½	20,339,410	66½	209,972,491	42	524,301,907	53
1871.....	357,909,770	66	20,087,211	70½	235,530,775	50	673,527,756	59½
1872.....	418,515,829	65½	15,161,218	66½	270,413,674	49¾	704,090,721	58
1873.....	426,321,427	64¼	18,972,099	67	313,129,963	48	758,423,489	56½
1874.....	395,133,622	66½	14,633,463	61½	340,360,269	49	750,127,354	57

The fiscal years end on Sept. 30 prior to 1843, after which they end on June 30. The values given in the table are in gold, with the exception of the domestic exports, which from 1862 are mostly in currency. The imports for the

nine months ending March 31, 1875, were \$275,154,929; exports, \$246,399,551. The following tables of imports and domestic exports for the year ending June 30, 1874, embrace the principal countries and articles:

COUNTRIES.	Imports from.	Exports to.	COUNTRIES.	Imports from.	Exports to.
Argentine Republic.....	\$2,056,155	\$1,809,341	Greece.....	\$423,305	\$32,668
Austria.....	434,931	966,214	Hayti.....	1,348,830	3,297,466
Belgium.....	3,865,023	10,796,248	Italy.....	5,421,740	3,985,373
Brazil.....	25,979,546	3,255,312	Japan.....	2,048,385	356,122
Central American states.....	194,550	281,921	Liberia.....	33,644	101,464
Chili.....	237,284	1,324,784	Mexico.....	5,508,043	1,439,253
China.....	11,013,846	632,881	Netherlands.....	2,032,739	7,605,647
Denmark.....	159,311	882,086	Dutch West Indies.....	1,290,533	657,780
Danish West Indies.....	291,885	956,397	Dutch East Indies.....	3,255,284	434,245
France.....	47,307,808	18,376,080	Peru.....	692,640	1,095,533
French West Indies.....	1,220,959	752,433	Portugal.....	451,959	1,360,705
Germany.....	41,093,655	36,287,769	Russia.....	590,183	1,212,405
Great Britain { England.....	126,764,649	156,639,737	Santo Domingo.....	177,371	414,895
{ Scotland.....	11,203,304	19,959,113	Spain.....	3,732,364	2,471,299
{ Ireland.....	788,123	23,323,105	Cuba.....	57,029,657	12,529,576
Gibraltar.....	7,952	1,952,778	Porto Rico.....	2,427,493	1,094,289
Dominion of Canada.....	713,195	1,784,828	Other Spanish possessions.....	8,370,410	100,313
Newfoundland and Labrador.....	109,901	1,432,461	Sweden and Norway.....	201,944	907,324
British West Indies.....	2,956,959	5,475,289	Turkey (Europe and Asia).....	361,545	1,777,205
British Guiana.....	547,673	929,698	Turkey (Africa).....	150,861	332,421
British East Indies.....	9,652,133	234,338	United States of Colombia.....	7,676,026	4,748,821
Hong Kong.....	400,491	24,513	Uruguay.....	2,404,662	647,112
British possessions in Africa.....	404,170	281,405	Venezuela.....	4,338,241	1,921,854
British possessions in Australia.....	500,326	2,501,526	All other places.....	673,641	463,892

* These figures relate to the entire state, but not far from 95 per cent. of the values represented belong to this port.

IMPORTS.		VALUE.
ARTICLES.		
Sugar (1,000,252,669 lbs.).....		\$49,298,625
Woollen manufactures:		
Dress goods (58,390,219 sq. yds.)..	\$16,868,983	
Cloths and cassimeres.....	9,583,558	
Carpets (2,510,097 sq. yds.).....	2,886,983	
Shawls.....	1,841,140	
Other manufactures.....	5,891,486	37,842,155
Coffee (172,595,005 lbs.).....		33,455,559
Silk:		
Dress and piece goods.....	14,935,958	
Other manufactures.....	7,391,560	
Raw (343,670 lbs.).....	1,827,393	24,155,711
Cotton manufactures:		
Hosiery, shirts, and drawers.....	4,042,770	
Bleached and unbleached (19,592,634 sq. yds.).....	2,405,676	
Printed, painted, or colored (14,500,060 sq. yds.).....	2,046,650	
Other manufactures.....	15,214,084	23,709,180
Gold and silver bullion and coin.....		18,401,242
Iron and steel manufactures:		
Steel railroad bars (224,237,614 lbs.)..	7,349,671	
Pig iron (106,756,527 lbs.).....	1,542,238	
Cutlery.....	1,814,789	
Other manufactures.....	7,577,226	17,783,924
Tea (39,391,658 lbs.).....		15,024,794
Flax manufactures.....		14,376,173
Hides and skins, not furs.....		10,879,623
Tin:		
In plates (983,210 cwt.).....	8,551,631	
In bars, blocks, or pigs (85,553 cwt.)..	2,310,643	10,862,274
Fruits and nuts.....		9,241,833
Tobacco and manufactures of:		
Leaf tobacco (8,559,065 lbs.).....	4,785,663	
Cigars (746,379 lbs.).....	2,637,904	7,423,567
Chemicals, drugs, dyes, and medicines.....		6,522,132
India rubber and gutta percha (13,166,507 lbs.)..		5,880,165
Leather (8,546,529 lbs.).....		5,682,506
Wines, spirits, and cordials.....		5,617,999
Glass and glassware.....		4,971,948
Soda and salts of (133,795,145 lbs.).....		4,464,233
Wool (21,691,625 lbs.).....		3,965,458
Fancy goods.....		3,806,044
Melado and sirup of sugar cane (86,806,943 lbs.)..		3,543,714
Flax seed (2,034,475 bushels).....		3,358,369
Molasses (13,729,643 galls.).....		3,066,551
Gloves of kid, &c. (443,719 doz. pairs).....		2,961,211
Earthen, stone, and china ware.....		2,906,063
Rags of cotton or linen (65,042,194 lbs.).....		2,843,971
Furs and fur skins.....		2,719,615
Hemp (16,640 tons).....		2,494,703
Books, pamphlets, engravings, &c.....		2,389,140
Watches and watch movements and materials..		2,184,456
Straw and palm-leaf manufactures.....		2,046,853
Precious stones.....		1,955,032
Buttons and button materials partly fitted.....		1,953,432
Wood and manufactures of.....		1,838,070
Hair:		
Human and manufactures of.....	716,872	
Other and manufactures of.....	933,443	1,650,320
Gums (9,895,429 lbs.).....		1,069,578
Clothing.....		1,592,547
Spices, including ginger, pepper, and mustard (9,031,103 lbs.).....		1,529,002
Opium and extracts of (250,604 lbs.).....		1,470,099
Jute:		
Raw (8,008 tons).....	899,647	
Manufactures of.....	536,764	1,436,411
Barley (1,067,018 bushels).....		1,348,998
Lead (27,622,266 lbs.).....		1,348,967
Hops.....		1,133,005
Paintings, chromo-lithographs, photographs, and statuary.....		1,068,623
Barks, medicinal (4,730,540 lbs.).....		1,057,227
Paper and manufactures of.....		1,056,394
Paints.....		931,793
Rice (29,864,744 lbs.).....		897,886
Beer and other malt liquors (995,033 galls.).....		886,984
Jewelry and manufactures of gold and silver....		728,857
EXPORTS.		
Bread and breadstuffs:		
Wheat (41,432,167 bush.).....	\$62,223,391	
Wheat flour (2,093,036 bbls.).....	15,049,823	
Indian corn (18,696,175 bush.).....	14,059,455	
Rye (1,844,559 bush.).....	1,354,165	
Indian corn meal (201,991 bbls.).....	817,148	
Bread and biscuit (3,136,436 lbs.).....	510,096	94,014,073

ARTICLES.	VALUE.
Provisions:	
Bacon and hams (238,602,635 lbs.)..	\$23,202,938
Lard (160,870,982 lbs.).....	14,946,337
Cheese (88,315,565 lbs.).....	11,624,406
Pork (42,482,749 lbs.).....	3,583,640
Beef (22,443,121 lbs.).....	1,782,963
Butter (3,620,653 lbs.).....	899,041
Gold and silver bullion and coin.....	46,433,564
Cotton:	
Raw (237,855,558 lbs.).....	41,489,597
Manufactures.....	1,556,316
Oils:	
Mineral, illuminating (129,213,255 galls.).....	23,121,059
Mineral, crude (18,367,003 galls.)..	1,624,697
Naphthas (7,895,742 galls.).....	859,104
Sperm and whale (834,496 galls.)..	883,351
Tobacco:	
Leaf (160,258,360 lbs.).....	16,117,749
Manufactures of.....	2,252,832
Iron and steel manufactures:	
Machinery.....	2,393,916
Muskets, pistols, &c.....	2,213,333
Edge tools.....	818,270
Locomotives (42).....	607,091
Other manufactures.....	2,148,494
Wood:	
Lumber, &c.....	3,776,321
Other manufactures of.....	1,325,906
Tallow (67,207,231 lbs.).....	5,373,177
Leather (11,960,991 lbs.).....	2,992,430
Furs and fur skins.....	2,977,619
Oil cake (122,378,065 lbs.).....	2,634,947
Agricultural implements.....	2,568,765
Hides and skins, not furs.....	1,717,419
Drugs, chemicals, and medicines.....	1,508,100
Sewing machines and parts of.....	1,317,486
Rosin and turpentine (322,042 bbls.).....	1,258,917
Hemp and manufactures of.....	959,111
Clocks and parts of.....	893,893
Railroad cars (831).....	745,016

The quantity and value of tea imported since 1857 are given below:

Fiscal years.	Quantity, lbs.	Value.	Fiscal years.	Quantity, lbs.	Value.
1857..	16,158,926	\$5,014,726	1866..	39,085,060	\$9,934,397
1858..	31,166,475	6,537,610	1867..	36,514,725	11,872,116
1859..	27,561,415	7,066,939	1868..	34,450,261	10,192,074
1860..	28,711,402	8,315,374	1869..	38,967,743	12,119,588
1861..	19,613,855	5,058,332	1870..	41,697,021	12,206,109
1862..	23,787,513	6,230,535	1871..	46,646,013	15,743,815
1863..	27,418,815	7,388,678	1872..	46,146,822	15,547,681
1864..	34,348,765	9,805,027	1873..	50,750,011	18,586,946
1865..	17,720,508	4,430,239	1874..	39,931,658	15,024,794

Previous to 1855 about one half the imports consisted of dry goods, but since that time the proportion of general merchandise has steadily increased, and dry goods now form less than one third of the total. The value of foreign dry goods imported into New York since 1849 has been as follows:

Calendar years.	Value.	Calendar years.	Value.	Calendar years.	Value.
1849..	\$44,435,571	1858..	\$60,154,509	1867..	\$86,263,643
1850..	60,106,375	1859..	113,152,624	1868..	80,905,534
1851..	62,846,731	1860..	103,927,100	1869..	94,726,417
1852..	61,654,144	1861..	43,636,689	1870..	109,498,523
1853..	93,704,211	1862..	56,121,227	1871..	132,480,777
1854..	80,842,936	1863..	67,274,547	1872..	136,831,612
1855..	64,974,062	1864..	71,619,752	1873..	114,160,465
1856..	93,362,893	1865..	91,965,138	1874..	106,520,453
1857..	90,534,129	1866..	126,222,825		

The relative proportion of the different classes of dry goods for the last three years are shown in the following table:

CLASS.	VALUE OF IMPORTS.		
	1872.	1873.	1874.
Woollen.....	\$42,794,836	\$37,999,047	\$34,275,882
Cotton.....	28,345,694	25,143,673	22,139,783
Silk.....	35,094,096	26,132,541	26,358,883
Flax.....	19,085,811	16,191,011	15,065,926
Miscellaneous.....	11,511,675	8,694,193	8,676,879

The movements of shipping in the foreign trade of the district for the year ending June 30, 1874, were as follows:

ENTRANCES.

FLAG.	SAILING VESSELS.		STEAMERS.		TOTAL.	
	No.	Tons.	No.	Tons.	No.	Tons.
American...	2,202	758,874	231	838,181	2,433	1,124,055
Foreign....	3,413	1,471,377	877	2,454,186	4,290	3,925,563
Total....	5,615	2,257,251	1,108	2,792,367	6,723	5,049,618

CLEARANCES.

FLAG.	SAILING VESSELS.		STEAMERS.		TOTAL.	
	No.	Tons.	No.	Tons.	No.	Tons.
American...	1,650	603,111	224	830,420	1,874	983,531
Foreign....	3,343	1,431,318	886	2,472,369	4,229	3,903,687
Total....	4,993	2,034,429	1,110	2,802,789	6,103	4,887,218

The following were the entrances and clearances in the coastwise trade for the same year:

	SAILING VESSELS.		STEAMERS.		TOTAL.	
	No.	Tons.	No.	Tons.	No.	Tons.
Entrances..	1,159	256,700	1,583	1,517,481	2,742	1,774,181
Clearances.	2,235	462,137	1,846	1,713,275	4,081	2,175,412

The number and tonnage of each class of vessels belonging in the district on June 30, 1874, and the same particulars for those built during the year ending on that date, are shown in the following table:

CLASS.	BELONGING.		BUILT.	
	No.	Tonnage.	No.	Tonnage.
Sailing vessels.....	2,810	600,020	89	7,592
Steamers.....	788	351,656	60	25,712
Canal boats.....	2,486	245,281	196	18,929
Barges.....	546	123,536	51	11,829
Total.....	6,630	1,318,523	396	64,002

Of the first total 847, tonnage 580,424, were registered; 5,225, tonnage 731,643, enrolled; and 558 (under 20 tons), tonnage 6,456, licensed. The number of vessels registered, enrolled, and licensed in the district on June 30, 1873, was 7,071, with an aggregate tonnage of 1,353,147, viz.: sailing vessels, 2,793, tonnage 596,789; steamers, 771, tonnage 349,313; barges, 525, tonnage 106,407; canal boats, 2,982, tonnage 300,638. The number of vessels built in the district during the year ending on that

date was 601, with an aggregate tonnage of 71,545.—About two thirds of the immigrants to the United States land at New York. The number landing at this port during the last ten years, compared with the entire immigration, has been as follows:

Calendar years.	New York.	United States.	Calendar years.	New York.	United States.
1865...	196,347	249,061	1870...	212,170	378,796
1866...	233,418	318,494	1871...	229,639	367,789
1867...	242,731	298,358	1872...	294,581	449,483
1868...	213,686	297,215	1873...	266,818	437,004
1869...	258,989	395,922	1874...	140,041	260,814

The whole number of aliens landing at New York since 1847 is 5,438,544. In that year a state board of emigration was constituted, which has in charge the interests of immigrants. The general landing depot is in Castle Garden at the Battery. This structure was originally a detached fort surrounded by water, erected by the federal government in 1807 and called Castle Clinton. It was ceded to the city in 1822, and was subsequently used as a place of amusement until leased by the commissioners of emigration in 1855. It was in this building that Jenny Lind made her first appearance in America. The commissioners have several institutions on Ward's island for the accommodation of sick and needy immigrants, viz.: the Verplanck state hospital, a lunatic asylum, houses of refuge, a nursery or home for children, &c. They generally contain about 1,000 inmates. (See EMIGRATION, vol. vi., p. 573.) The quarantine establishment is situated on artificial islands constructed for the purpose on the West bank, a shoal off the E. shore of Staten island. The health officer of the port resides at the "boarding station," on Staten island. The West Bank hospital, completed in 1869 at a cost of more than \$500,000, is a one-story edifice, divided into eight wards, each 89 ft. long and 24 wide, and each capable of accommodating 50 patients. It is lighted with gas and connected with the city by telegraph. There is also a building for the detention of persons exposed to disease while on passage in infected vessels, and a warehouse for the storage of infected goods. These institutions are under the control of a state board of quarantine commissioners.—Only partial statistics of the internal and coasting trade are obtainable. The former is carried on by means of the Hudson river and the Erie and other canals, as well as by rail. The completion of the Erie canal in 1825 made New York the maritime outlet for the surplus produce of the great west. Previous to that time western produce went down the Susquehanna to Baltimore or the Schuylkill to Philadelphia; and except in the region tributary to the Hudson river and Long Island sound, New York had no domestic commerce. The five following tables relating to the principal articles of domestic produce are from the annual report of the produce exchange for 1873-'4:

RECEIPTS FOR NINE CALENDAR YEARS.

ARTICLES.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
BREADSTUFFS.									
Flour, bbls.	2,721,657	2,605,849	2,855,986	3,587,589	4,120,941	3,576,068	3,038,364	3,518,887	4,017,207
Wheat, bush.	5,766,664	9,706,504	12,950,068	28,952,250	23,913,748	26,763,967	16,221,907	34,624,931	41,817,215
Corn, bush.	22,218,519	15,024,221	18,995,072	10,691,749	9,230,340	26,849,916	40,757,115	24,650,881	29,329,000
Oats, bush.	8,703,220	8,054,164	10,278,781	8,721,608	9,621,936	12,436,260	12,264,226	11,012,924	10,792,919
Barley, bush.	5,076,203	2,223,769	2,274,255	2,524,663	3,907,822	2,926,223	3,973,303	1,820,576	*2,776,025
Rye, bush.	1,277,701	743,984	775,612	865,468	563,184	1,063,033	491,851	849,873	592,114
Peas, bush. ....	.....	.....	.....	.....	198,514	114,781	192,560	172,345	583,069
Malt, bush.	594,314	443,105	514,620	473,988	1,053,597	793,046	1,124,953	571,494	.....
Corn meal, bbls.	120,562	66,073	125,802	90,676	56,987	90,675	160,587	155,744	178,775
Corn meal, sacks.	298,510	829,079	315,505	220,782	262,547	177,633	92,336	151,652	.....
Total grain (reducing flour and meal), bush.	58,352,367	50,256,203	61,234,620	65,241,404	69,921,175	89,543,673	90,930,336	92,137,971	106,870,252
PROVISIONS.									
Pork, bbls.	130,865	150,463	103,823	95,725	124,554	169,726	146,629	181,241	152,216
Beef, bbls. and tcs.	65,574	105,734	91,769	80,196	121,877	155,800	47,178	38,202	64,944
Cut meats, bbls. and tcs.	98,073	113,988	82,415	79,552	146,540	180,919	332,469	563,903	335,793
Lard, bbls. and tcs.	205,077	433,092	285,659	205,950	171,745	275,444	358,754	409,203	386,973
Lard, kegs. ....	.....	.....	.....	.....	45,071	23,617	28,852	28,977	38,983
Dressed hogs, No.	91,591	73,379	101,060	87,214	70,411	112,299	83,103	107,191	.....
Tallow, pkgs. ....	.....	.....	25,736	13,419	13,605	42,666	39,622	58,193	.....
SUNDRIES.									
Seeds, bush.	139,943	66,722	72,093	21,253	101,549	336,700	280,632	212,916	.....
Ashes, casks.	5,964	4,806	6,109	8,092	6,863	6,424	6,712	7,412	8,824
Cotton, bales.	667,069	657,371	567,965	662,622	873,467	732,314	755,054	955,150	991,272
Oil cake, pkgs.	114,010	92,898	55,692	106,485	102,162	73,277	143,926	185,101	.....
Whiskey, bbls.	101,375	147,210	47,694	183,432	177,371	166,825	177,096	195,805	185,410
NAVAL STORES.									
Crude turpentine, bbls.	32,248	11,428	11,119	14,079	6,661	8,986	9,686	11,158	12,606
Spirits turpentine, bbls.	63,027	62,644	64,078	65,632	70,280	67,937	76,056	67,805	76,509
Rosin, bbls.	379,541	395,505	448,644	557,150	496,293	508,933	582,063	470,213	535,166
Tar, bbls.	45,412	24,238	37,008	76,255	46,973	19,376	29,382	38,275	46,511
Pitch, bbls. ....	.....	.....	.....	7,710	2,342	1,111	1,827	2,109	3,730
DAIRY PRODUCTS.									
Butter, pkgs.	458,952	557,397	503,516	636,879	547,308	993,307	695,827	948,520	980,853
Cheese, boxes.	731,740	1,304,904	1,108,627	1,333,305	1,549,507	1,459,623	1,718,732	2,007,663	2,038,240

EXPORTS TO FOREIGN PORTS FOR THE SAME PERIOD.

ARTICLES.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
BREADSTUFFS.									
Flour, bbls.	910,508	949,318	1,195,819	1,584,735	1,937,793	1,618,814	1,182,240	1,661,606	2,177,603
Wheat, bush.	626,713	4,665,315	5,969,878	17,526,900	18,444,603	22,027,443	13,263,604	27,758,714	34,791,249
Corn, bush.	11,625,826	8,455,920	6,812,237	1,800,122	469,543	12,318,637	25,332,416	16,163,152	19,000,995
Oats, bush.	1,190,583	144,665	94,707	49,393	28,986	47,757	32,243	49,535	122,523
Barley, bush.	1,329,842	886,393	90	.....	.....	95,504	17,402	40,120	3,560
Rye, bush.	243,646	473,260	152,993	142,542	225,050	525,511	607,165	1,018,038	641,661
Peas, bush.	282,992	680,763	189,226	123,156	290,758	101,956	155,343	138,132	463,193
Corn meal, bbls.	149,773	151,669	191,011	187,627	102,663	127,203	194,040	181,445	168,603
Total grain (reducing flour and meal), bush.	20,306,461	20,503,413	19,771,239	27,978,669	29,455,914	43,505,502	45,901,493	54,020,056	66,754,241
PROVISIONS.									
Pork, bbls.	95,905	93,494	89,887	63,541	92,503	163,494	159,296	199,553	173,070
Beef, bbls. and tcs.	39,942	24,325	32,483	52,300	73,823	137,568	90,018	102,416	94,023
Lard, lbs.	26,256,700	52,726,900	49,395,500	36,915,400	31,519,100	121,914,203	173,616,695	183,633,441	139,982,979
Bacon, lbs.	30,993,300	38,820,000	44,993,600	41,424,400	31,507,300	92,144,591	208,373,391	307,044,238	222,430,343
Tallow, lbs. ....	.....	18,498,600	13,243,300	23,394,000	18,245,500	41,742,533	54,907,403	61,801,282	56,640,728
†Butter, lbs.	1,552,021	1,584,000	80,624	87,358	753,902	7,173,252	4,817,937	3,587,376	4,611,896
†Cheese, lbs.	43,459,443	57,105,633	39,006,569	50,938,500	58,724,491	81,540,662	67,004,553	89,477,438	94,102,050
SUNDRIES.									
Petroleum, galls.	34,501,385	33,834,133	52,803,202	65,993,690	87,667,397	94,916,584	93,306,213	146,801,172	138,420,380
Cotton, bales.	476,038	494,411	376,475	290,229	483,810	608,027	354,135	600,279	571,638
Ashes, casks.	3,052	3,330	3,064	3,186	2,325	1,905	1,832	1,194	2,222
NAVAL STORES.									
Crude turpentine, bbls.	13,596	827	704	812	403	283	529	365	822
Spirits turpentine, bbls.	22,113	31,125	17,635	17,810	17,342	15,272	21,246	20,103	10,941
Rosin, bbls.	234,367	312,441	367,421	453,357	395,063	379,051	436,819	395,886	383,543
Tar, bbls.	20,461	4,633	9,977	35,555	15,502	9,594	15,940	22,167	26,520
Pitch, bbls. ....	.....	.....	.....	5,030	3,720	2,779	3,503	8,499	5,596

* Including malt.

† From 1866 to 1870, inclusive, the exports are from May 1 to April 30.

ESTIMATED VALUE

*Of the principal Articles of Domestic Produce exported
from New York during the Year 1878.*

CALENDAR YEARS.	Cattle.	Sheep.	Live hogs.	Calves.
1860.....	284,077	518,750	823,918	89,486
1861.....	228,584	512,386	559,421	82,368
1862.....	244,862	494,342	1,148,209	80,465
1863.....	270,561	519,316	1,101,699	85,709
1864.....	275,212	782,462	517,673	75,621
1865.....	279,435	836,738	532,194	77,991
1866.....	308,767	1,030,621	656,639	62,114
1867.....	294,056	1,139,596	1,000,113	69,636
1868.....	296,419	1,415,511	887,351	72,604
1869.....	380,308	1,470,828	901,725	91,520
1870.....	361,016	1,463,878	889,625	116,457
1871.....	379,372	1,516,408	1,310,280	121,171
1872.....	433,664	1,179,518	1,923,727	115,180
1873.....	447,445	1,206,715	2,019,904	116,015
1874.....	457,709	1,165,653	1,774,221	104,719

*Of the principal Articles of Domestic Produce received
at New York during the Year 1873.*

ARTICLES.	Quantity.	Value.
Breadstuffs:		
Flour, bbls.	3,513,857	\$22,840,266
Wheat, bush.	84,624,931	51,987,396
Corn, bush.	24,650,531	17,276,582
Oats, bush.	11,012,924	5,506,462
Barley, bush.	1,820,576	3,156,008
Rye, bush.	849,573	849,573
Peas, bush.	172,345	172,345
Malt, bush.	571,494	1,142,988
Beans, bush.	213,520	543,800
Corn meal, bbls.	155,744	622,976
Corn meal, sacks	151,652	454,956
Seeds, bush.	212,916	1,053,748
		\$105,592,400
Provisions:		
Pork, bbls.	181,241	\$2,715,181
Beef, bbls. and tcs.	88,202	687,636
Lard, bbls. and tcs.	409,203	13,004,206
Lard, kegs	28,977	205,889
Cut meats, pkgs.	568,908	28,195,150
Tallow, pkgs.	53,193	4,645,440
Grease, pkgs.	22,987	454,727
Steaming, pkgs.	22,836	856,350
Dressed hogs, No.	107,191	1,500,674
Cheese, boxes	2,007,663	16,864,369
Butter, pkgs.	948,520	19,918,920
*Eggs, bbls.	471,593	8,258,127
		\$97,433,053
Live hogs, No.	2,019,904	\$15,149,280
Naval stores:		
Tar, bbls.	38,275	\$114,825
Pitch, bbls.	2,109	5,272
Rosin, bbls.	473,213	1,419,639
Spirits turpentine, bbls.	67,805	1,195,848
Crude turpentine, bbls.	11,158	111,583
		\$2,847,167
Sundries:		
Wool, lbs.	16,650,983	\$6,660,373
Ashes, casks	7,412	355,796
Petroleum, bbls.	3,640,000	21,000,000
Whiskey, bbls.	195,805	9,790,000
Oil cake, pkgs.	185,101	740,400
		\$38,546,569
Total estimated value		\$259,568,469

There are other articles which would swell the aggregate value to more than \$300,000,000. These include buckwheat flour, fish, apples and other fruits, vegetables, cattle, sheep, horses, hay, hops, cotton, tobacco, oils, coal, wood, and numerous articles of minor importance. Cotton is brought here from all parts of the south for shipment. Immense quantities of coal are required to supply the European steamers as well as for domestic use.

* About 70 dozen to a barrel.

ARTICLES.	Quantity.	Value.
Breadstuffs:		
Flour, bbls.	1,661,606	\$10,800,489
Corn meal, bbls.	181,445	635,057
Wheat, bush.	27,753,714	41,630,571
Corn, bush.	16,168,152	10,347,617
Oats, bush.	49,635	24,767
Barley, bush.	40,120	50,150
Eye, bush.	1,018,038	956,956
Peas, bush.	138,182	172,065
Barley malt, bush.	815	1,141
Beans, bush.	75,756	189,390
Oatmeal, bbls.	970	67,900
Clover seed, bags.	66,594	998,910
		\$65,875,562
Provisions:		
Pork, bbls.	199,558	\$3,043,259
Beef, bbls. and tes.	102,416	1,662,706
Lard, lbs.	183,633,441	15,914,898
Bacon, lbs.	307,044,288	26,148,764
Tallow, lbs.	61,801,282	5,098,606
Butter, lbs.	3,587,376	1,147,960
Cheese, lbs.	89,477,383	11,632,072
Stearine, lbs.	2,426,683	206,268
Grease, lbs.	6,845,384	479,177
		\$65,833,710
Oils, gallons:		
Cotton seed	362,235	\$199,229
Whale	64,693	25,879
Sperm	419,179	734,613
Lard	262,511	326,269
Linseed	10,970	8,776
Fish oil	819,682	207,793
Naphtha	8,327,822	921,889
Petroleum, refined.	138,276,472	25,150,145
Benzine	196,873	19,688
Oil cake, lbs.	123,208,797	2,464,160
		\$30,088,481
Naval stores:		
Crude turpentine, bbls.	365	\$1,095
Spirits " "	20,108	10,054
Kosin, bbls.	395,886	1,227,246
Pitch, bbls.	3,499	8,747
Tar, bbls.	22,167	83,127
		\$1,330,269
Sundries:		
Hops, bales	8,290	\$663,200
Wool, bales	10,110	808,800
Whiskey, bbls.	1,205	46,176
Ashes, casks	1,194	47,880
Hay, bales	23,354	70,065
Alcohol, bbls.	31,990	2,456,832
		\$4,092,958
Total estimated value.....		\$166,720,925

There are in New York and Brooklyn 63 stationary grain warehouses, including stores, with a storage capacity of 11,450,000 bushels, and 33 floating elevators, with a transfer capacity of both in the aggregate of 195,000 bushels per hour. The operations in Spanish and leaf tobacco for the last five years were :

CALENDAR YEARS.	SPANISH, BALES.			LEAF, HHDS.		
	Received.	Taken for consumption.	Stock on hand at beginning of year.	Received.	Shipped.	Stock.
1870.....	59,215	56,360	15,999	69,854	48,555	16,488
1871.....	75,982	82,044	18,854	97,886	82,313	12,659
1872.....	144,581	127,827	12,792	67,485	53,119	6,569
1873.....	82,610	95,456	29,496	115,224	94,865	11,885
1874.....	103,456	111,685	16,650	124,544	73,994	46,445

The receipts of wool and the deliveries of naval stores for consumption since 1867 have been :

CALENDAR YEARS.	WOOL, LBS.			NAVAL STORES, BBLs.			
	From domestic ports and interior.	From foreign ports.	Total.	Turpentine.	Spirits turpentine.	Rosin.	Tar.
1867.....	21,716,200	17,904,779	39,620,979	10,790	86,184	98,878	28,465
1868.....	34,765,200	12,819,361	47,087,561	10,901	46,180	69,141	23,606
1869.....	27,041,200	21,490,430	48,531,630	10,375	45,193	136,137	32,273
1870.....	30,569,200	12,470,351	43,339,551	5,952	53,341	103,653	30,471
1871.....	24,980,200	39,411,118	64,391,318	8,266	51,849	120,736	18,183
1872.....	20,294,000	48,883,668	69,177,668	10,583	66,259	113,530	17,493
1873.....	21,895,800	20,768,507	42,659,607	10,197	66,665	151,637	15,593
1874.....	24,273,600	25,310,281	49,583,881	11,157	62,676	149,824	13,071

The following table exhibits the quantity of coffee and of domestic and foreign sugar and molasses taken from the port for consumption for 20 years:

CALENDAR YEARS.	Coffee, lbs.	Sugar, tons.	Molasses, gallons.
1855.....	74,919,075	159,326	12,876,434
1856.....	82,674,590	171,616	9,818,923
1857.....	60,892,824	147,810	9,164,787
1858.....	98,156,662	185,801	11,239,635
1859.....	88,700,472	190,135	12,010,290
1860.....	66,885,297	213,325	10,836,519
1861.....	103,800,586	188,855	8,406,269
1862.....	67,564,315	219,330	12,026,808
1863.....	64,607,080	195,164	18,162,293
1864.....	85,896,097	142,047	16,843,785
1865.....	109,209,790	213,568	16,752,130
1866.....	114,514,295	227,134	18,378,052
1867.....	132,335,511	220,437	20,639,904
1868.....	150,316,962	240,555	21,950,924
1869.....	150,727,756	254,579	20,810,750
1870.....	153,968,572	267,265	18,464,451
1871.....	157,992,642	323,735	19,248,616
1872.....	156,157,854	331,025	17,454,053
1873.....	154,253,838	356,110	14,885,675
1874.....	180,965,844	435,265	14,147,344

The value of foreign dry goods thrown upon the market in 1872 was \$132,330,866; in 1873, \$115,488,346; in 1874, \$108,898,694. The importers and jobbers of New York supply directly or indirectly a large portion of the demand of the country for foreign goods and many articles of domestic manufacture, and their agents are found in every section of the Union. Its retail stores are unsurpassed for size and magnificence by those of any other city. The chamber of commerce, an influential body of leading merchants and business men, organized in 1768 and incorporated by royal charter in 1770, holds monthly meetings to consider questions affecting the interests of trade and commerce generally. It publishes annual reports, from which a part of the commercial statistics of this article are derived. The legislative act of April 24, 1874, created a tribunal of arbitration for the settlement of mercantile or commercial disputes between members of the chamber, or other persons who may voluntarily submit to its jurisdiction. The arbitrator is appointed by the governor with the consent of the senate during good behavior; his decisions are final, and a judgment may be entered thereon with the same force and effect as a judgment of the supreme court. The produce exchange, cotton exchange, and other similar organizations are important

bodies.—On Oct. 2, 1874, there were 48 national banks in the city, and their condition was as follows:

RESOURCES.

Loans and discounts.....	\$201,777,054
Overdrafts.....	426,116
Bonds for circulation.....	30,899,100
Bonds for deposits.....	650,000
U. S. bonds on hand.....	7,685,750
Other stocks and bonds.....	7,089,934
Due from other national banks.....	11,951,903
Due from other banks and bankers.....	2,006,414
Real estate, furniture, and fixtures.....	8,784,927
Current expenses.....	1,983,801
Premiums.....	1,437,170
Checks and other cash items.....	2,230,570
Exchanges for clearing house.....	76,860,065
Bills of other national banks.....	2,191,418
Bills of state banks.....	1,947
Fractional currency.....	263,427
Specie.....	14,406,267
Legal-tender notes.....	20,874,565
U. S. certificates of deposit.....	31,555,000
5 per cent. redemption fund with U. S. treasurer.....	1,464,616
Additional amount with U. S. treasurer.....	293,845
Total.....	\$424,738,914

LIABILITIES.

Capital stock.....	\$68,500,000
Surplus fund.....	22,653,881
Undivided profits.....	12,042,089
National bank notes outstanding.....	25,291,781
State bank notes outstanding.....	115,501
Dividends unpaid.....	246,682
Individual deposits.....	201,323,282
U. S. deposits.....	422,509
Deposits of U. S. disbursing officers.....	25,788
Due to national banks.....	68,189,355
Due to other banks and bankers.....	25,230,753
Notes and bills rediscounted.....	
Bills payable.....	691,993
Total.....	\$424,738,914

The number of state banks of deposit and discount on Jan. 1, 1875, was 26, and their condition was as follows:

RESOURCES.

Loans and discounts, less due from directors and brokers.....	\$43,305,720
Overdrafts.....	22,639
Due from banks.....	3,617,953
Due from directors.....	1,392,694
Due from brokers.....	1,792,308
Real estate.....	1,602,211
Specie.....	2,145,329
Cash items.....	10,855,805
Stocks, promissory notes, and U. S. certificates of indebtedness.....	1,270,901
Bonds and mortgages.....	146,515
Bills of solvent banks and U. S. demand and legal-tender notes.....	5,242,773
Loss and expense account.....	599,467
Assets, not included under either of the above heads.....	93,456
Total.....	\$72,118,143

LIABILITIES.

Capital.....	\$16,688,200
Notes in circulation.....	87,921
Profits.....	6,870,701
Due banks.....	5,052,742
Due individuals and corporations other than banks and depositors.....	344,955
Due treasurer of the state of New York.....	95,925
Due depositors on demand.....	42,897,903
Amount due, not included under either of the above heads.....	132,769
Total.....	\$72,118,149

The clearing house, organized in 1853 to facilitate the transaction of business and the settlement of accounts between its members, comprised 59 banks at the close of 1874. Its transactions during the year were as follows: exchanges, \$22,223,212,644; balances, \$1,024,709,941. A gold exchange was introduced into the clearing-house transactions in 1872, the business of which in 1874 was as follows: exchanges, \$2,226,832,248; balances, \$332,395,085. There were 44 savings banks on Jan. 1, 1875: aggregate resources, \$195,335,164; number of accounts open, 494,086; amount due depositors, \$180,010,703. The three having the largest amounts of deposits are: Bowery savings bank, \$27,169,481; bank for savings, \$20,582,990; seamen's bank for savings, \$13,822,402. There are 10 trust companies: aggregate resources July 1, 1874, \$55,489,822; paid-in capital, \$11,318,000; deposits in trust, \$22,050,068; general deposits, \$14,801,720. The number of fire insurance companies on Jan. 1, 1875, was 54, and of fire and marine companies, 17: aggregate assets, \$41,961,107; liabilities, except scrip, and capital, \$10,487,652; scrip, \$694,621; capital stock paid in, \$20,104,020; fire risks outstanding, \$1,906,696,231; marine and inland risks outstanding, \$2,074,314. There were 9 marine insurance companies: aggregate assets, \$25,-

035,786; liabilities, except scrip and capital, \$7,444,444; scrip, \$11,974,655; joint stock capital, \$1,662,080; marine and inland risks outstanding, \$166,835,990; fire risks outstanding, \$8,725,514. The condition of the life insurance companies, 20 in number, was as follows: aggregate assets, \$189,813,950; liabilities, except capital, \$163,249,701; capital stock, \$3,555,500; number of policies outstanding, 356,944; amount of same, \$973,115,417. The United States assay office was established in 1854. Its operations to the close of 1874 were as follows: gold deposits, \$286,113,919; silver deposits, \$32,320,330; silver parted from gold, \$2,094,265; fine silver bars manufactured, \$18,349,245; fine gold bars manufactured, \$222,302,258; gold transmitted to Philadelphia mint for coinage, \$145,700,196; silver transmitted, \$19,271,990. The deposits of bullion in 1874 were \$12,415,944; gold and silver bars manufactured, \$9,802,326; bullion transmitted to mint, \$5,083,148.—The manufactures of New York, though secondary in importance to its commercial and mercantile interests, are varied and extensive. In the value of products, according to the census of 1870, it is the first city in the Union, though surpassed by Philadelphia in the value of materials used, amount of capital invested, and number of establishments and hands employed. The whole number of manufacturing establishments in 1870 was 7,624, employing 1,261 steam engines of 28,716 horse power, and 16 water wheels of 863 horse power; number of hands employed, 129,577, of whom 91,305 were males above 16, 32,281 females above 15, and 5,991 youth; amount of capital invested, \$129,952,262; wages paid during the year, \$63,824,040; value of materials used, \$178,696,939; of products, \$332,951,520. The statistics of the principal branches are as follows:

INDUSTRIES.	No. of establishments.	No. of hands employed.	Value of materials.	Value of products.
Artificial flowers.....	85	1,109	\$303,226	\$767,475
Bags, other than paper.....	6	339	1,116,950	1,625,000
Belting and hose (leather).....	13	171	693,500	1,093,000
Billiard and bagatelle tables.....	10	159	229,618	606,250
Bookbinding.....	65	2,044	2,712,728	4,187,815
Boots and shoes.....	162	4,287	3,140,279	6,935,865
Boxes, packing.....	105	1,947	1,163,919	2,872,759
Brass founding and finishing.....	49	555	487,967	1,091,117
Brass, rolled and sheet.....	2	317	350,000	635,000
Bread and other bakery products.....	455	2,344	3,848,097	6,728,587
Brooms and wisp brushes.....	27	581	434,308	1,063,400
Cards, playing.....	4	215	370,000	655,000
Carpets, other than rag.....	5	2,438	2,275,000	3,702,600
Carriages and wagons.....	95	1,768	1,355,389	3,684,578
Chromos and lithographs.....	22	351	196,095	594,050
Clothing, children's.....	4	1,194	335,045	550,000
“ men's.....	739	17,084	21,384,214	34,456,884
“ women's.....	209	8,663	1,723,916	3,824,882
Coffee and spices, ground.....	14	174	2,426,384	3,748,430
Collars and cuffs, paper.....	8	742	392,000	994,000
Confectionery.....	108	1,120	1,442,912	3,809,623
Cooperage.....	67	929	558,277	1,163,123
Drugs and chemicals.....	29	486	1,204,000	2,252,950
Engraving.....	30	769	800,501	1,305,308
Envelopes.....	7	330	523,800	1,067,500
Fathers, cleaned, dressed, &c.....	16	479	365,500	693,525
Flouring mill products.....	7	275	5,005,130	5,999,600
Frames, mirror and picture.....	53	857	626,761	1,492,329
Fruits, canned and preserved.....	7	153	773,000	981,500

INDUSTRIES.	No. of establishments.	No. of hands employed.	Value of materials.	Value of products.
Furniture, not specified.....	295	4,887	\$3,892,497	\$10,256,045
" chairs.....	48	470	408,515	1,079,411
Gas.....	4	1,162	1,666,915	3,854,432
Gas and lamp fixtures.....	16	773	441,642	1,322,000
Gold leaf and foil.....	13	229	117,100	601,680
Grease and tallow.....	6	79	2,638,710	3,037,000
Hair work.....	59	689	294,044	693,060
Hardware.....	53	690	455,070	1,159,825
Hat materials.....	32	541	1,058,753	1,777,972
Hats and caps.....	92	2,793	2,435,951	4,665,957
Heating apparatus.....	9	281	510,412	997,995
Hoop skirts and corsets.....	26	2,231	1,265,754	2,709,566
India-rubber and elastic goods.....	6	418	937,105	1,606,000
Iron, forged and rolled.....	6	204	392,590	672,125
" bolts, nuts, &c.....	3	76	47,194	151,000
" nails and spikes, cut, &c.....	8	34	32,231	53,800
" railing, wrought.....	19	188	153,263	431,100
" pigs.....	1	50	255,000	400,000
" castings.....	54	3,365	3,062,091	7,243,027
Jewelry.....	193	3,508	3,851,297	9,595,700
Lead, pig.....	2	30	916,350	970,500
" pipe.....	6	43	7,520,990	10,607,800
" shot.....	2	13	393,900	486,000
Leather, tanned.....	19	520	1,125,955	1,771,704
" curried.....	13	49	676,122	900,000
" morocco, tanned, &c.....	12	173	451,152	634,366
Liquors, malt.....	60	1,039	4,903,279	7,770,650
Lumber, planed.....	9	273	993,500	1,359,300
Machinery, not specified.....	53	2,439	1,773,209	4,639,410
" engines and boilers.....	31	1,343	964,331	2,687,967
Malt.....	13	237	1,839,750	2,898,973
Marble and stone work.....	72	1,772	1,613,277	4,132,880
Masonry, brick and stone.....	19	1,238	1,300,860	2,494,534
Millinery.....	39	1,106	440,883	898,719
Mineral and soda waters.....	34	331	230,363	701,001
Molasses and sugar, refined.....	10	121	21,514,237	25,794,333
Musical instruments, not specified.....	11	100	74,020	193,654
" " organs.....	11	240	146,190	531,300
" " pianos.....	69	2,013	1,499,376	3,863,225
Oil, animal.....	5	63	563,555	1,049,463
Paints.....	14	237	1,253,250	2,003,250
Paper, printing.....	14	793	1,504,300	2,737,000
" other than printing.....	6	126	142,600	327,000
Patent medicines.....	34	369	1,307,100	2,645,000
Photographic material.....	2	102	120,500	695,200
Printing of cloths.....	3	65	749,600	817,100
Printing, not specified.....	14	1,669	2,510,250	5,311,260
" book.....	15	232	392,284	766,720
" newspaper.....	23	1,005	1,909,766	3,987,566
" job.....	69	857	499,567	1,509,335
Saddlery and harness.....	93	608	370,999	990,433
Sash, doors, and blinds.....	35	560	629,450	1,365,700
Sewing machines.....	10	2,961	850,650	6,060,149
Ship building and repairing.....	46	589	454,480	1,397,061
Silk goods.....	6	311	292,000	568,573
Silver ware.....	12	244	351,950	761,000
Soap and candles.....	23	679	2,888,593	4,522,710
Starch.....	3	621	1,500,000	2,700,000
Straw goods.....	15	1,390	357,890	950,000
Tin, copper, and sheet-iron ware.....	136	1,080	1,017,324	2,177,630
Tobacco and cigars.....	3	84	171,200	244,900
" other than cigars, and snuff.....	13	472	1,913,735	3,904,881
" cigars.....	640	3,525	2,376,958	5,956,970
Type founding.....	11	588	563,213	1,273,252
Umbrellas and canes.....	28	1,121	772,169	1,812,839
Upholstery.....	45	710	716,263	1,082,672
Varnish.....	6	115	1,257,400	1,774,700
Watch cases.....	33	511	796,000	1,754,500
Wire.....	1	202	402,000	750,000
" work.....	29	1,232	710,739	1,424,850
Wood work.....	79	585	534,099	1,247,313

In the district annexed since the census there are some important establishments, the most noteworthy of which are the extensive breweries in Morrisania. The value of manufactures in 1860 was \$159,107,369.—Under the charter of 1873, the city is governed by a mayor and a board of 22 aldermen, with various boards of commissioners. It is divided into 24 wards and 557 election districts, forms the first judicial district of the state, and, with the exception of the 23d and

24th wards (which elect with Westchester co. until a new apportionment is made), sends 5 senators and 21 assemblymen to the state legislature, and 7 members to congress. The mayor is elected by the qualified voters for a term of two years, and receives an annual salary of \$12,000. The aldermen are chosen annually, and receive a salary of \$4,000 each, except the president of the board, who receives \$5,000. Six are elected by the voters of the city at large (no one being permitted to

vote for more than four candidates), and three from each of the four lower senate districts (no one being permitted to vote for more than two). The upper senate district with the 23d and 24th wards elects four aldermen (no one being permitted to vote for more than three). The commissioners and heads of departments are appointed by the mayor with the consent of the board of aldermen. They receive salaries varying from \$3,000 to \$15,000 a year, and their terms of office vary from three to six years. The principal officers of the finance department are the comptroller and chamberlain or treasurer; the latter receives a salary of \$30,000, out of which he pays clerk hire and office expenses. The department of taxes and assessments is under the direction of three commissioners. The mayor, comptroller, president of the board of aldermen, and president of the department of taxes and assessments constitute the board of apportionment, which fixes the amount to be raised by taxation. The president of the department of taxes and assessments and two others, appointed by the mayor and removable at pleasure, are commissioners of accounts, whose duty it is to examine the accounts and expenditures of the various departments. The commissioner of public works has charge of the public buildings, streets, sewers, water, gas, &c. The superintendent of buildings is charged with the duty of seeing that the laws and ordinances respecting the construction of buildings are complied with. The principal officers of the law department are the corporation counsel, corporation attorney, and public administrator. The board of health consists of the president of the board of police, the health officer of the port (a state official), and two commissioners. Three commissioners of excise grant licenses for the sale of intoxicating liquors. The courts of general jurisdiction in civil matters are the supreme court for the first district, with five justices (salary \$17,500), and the superior court and court of common pleas with six judges each (salary \$15,000). The justices and judges are elected for a term of 14 years. The surrogate, recorder, and city judge (salary \$15,000 each) are elected for six years. The superior criminal courts are the oyer and terminer, held by a justice of the supreme court, and the general sessions, held by the recorder or city judge (after Jan. 1, 1876, to consist of three judges, term 14 years). The marine court has civil jurisdiction to the amount of \$1,000, and consists of six judges (salary \$10,000) elected for six years. For the purposes of district courts, which have civil jurisdiction to the amount of \$250, the city is divided into 10 judicial districts, in each of which a justice (salary \$8,000) is elected for a term of six years. There are 11 police justices (salary \$8,000), appointed by the mayor with the consent of the board of aldermen for a term of 10 years, each of whom has power to hold a police court in either of the six police court districts.

Two police justices hold the court of special sessions, with power to try cases of misdemeanor. The sheriff, county clerk, district attorney, and register are the principal other officers. The county government in most respects is identical with that of the city, the aldermen acting as supervisors. The United States courts for the southern district of New York are held in the city. For police purposes it is divided into 32 precincts, with one sub-precinct. The river and harbor police constitute one of these precincts, employing a steamer and several small boats in patrolling the waters adjacent to the city. The force consists of a superintendent, 4 inspectors, 35 captains, 140 sergeants, 78 doormen (attached to the station houses), and 2,260 patrolmen. Included in these numbers are the sanitary squad, 64 men; court squad, 42; mounted squad, 13; and detective force, 30. There are in addition 20 surgeons, a superintendent of telegraphs and four telegraph operators at the central office, and a chief clerk and 21 clerks. The police department is under the control of four commissioners. Attached to it is the bureau of street cleaning. The central office is connected with the different stations by lines of telegraph. The value of lost property restored to owners by the department in 1874 exceeded \$1,200,000; number of lodgings furnished in the station houses, about 230,000, of which three fourths were to persons classed as "habituals;" number of lost children restored to their parents, more than 4,000. The number of prisoners arraigned before the police courts during the year ending Oct. 31, 1874, was 84,821 (60,213 males and 24,608 females), of whom 35,561 were discharged, 49,251 held for trial, and 9 cases were pending at the date of the report. Of those held, 32,906 were males and 16,345 females; 40,827 were disposed of by the magistrates, and 8,424 were sent to the general and special sessions for trial; 10,671 were born in the United States, 18,089 in Ireland, 3,927 in Germany, 1,753 in other foreign countries, and the nativity of 14,811 was not given. The number arraigned for different classes of offences, with the disposition of cases, was as follows:

CLASSIFICATION.	Ma'le.	Female.	Total.
Felonies.....	4,131	490	4,621
Held for trial.....	2,718	200	2,998
Misdemeanors.....	10,579	1,847	12,426
Held for trial.....	5,894	918	6,812
Intoxication.....	27,263	18,574	40,777
Convicted.....	14,186	8,927	23,113
Disorderly conduct.....	11,939	6,305	16,264
Fined or bailed.....	5,962	4,081	10,043
Vagrancy.....	1,751	1,888	3,189
Held for trial.....	.....	.....	2,865
Children sent to reformatories....	660	214	874

The fines collected through the police courts and court of special sessions amounted to \$71,287 25. The paid fire department, organized in 1865, is one of the best equipped and most efficient in the world. The city is divided into

ten divisions, in each of which a battalion is organized consisting of several companies. The force consists of a chief and 748 officers and men, organized into 42 steam engine companies, 18 hook and ladder companies, and 4 chemical engine companies. The chemical engines carry their own supply of extinguishing fluid. Steam engines used by the department are drawn by horses, except five, which are propelled by the steam they generate. There are four boats equipped for extinguishing fires on the water front, of which two belong to the department of charities and correction and one to the police department. The central office in Mercer street is connected with the different engine houses by telegraph wires, and there are 548 street boxes, from which an alarm of fire may be transmitted instantaneously. The telegraph force consists of a superintendent, a chief operator, and six assistants. The fire department is under the control of three commissioners. The bureau of combustibles connected with it is charged with the duty of regulating and licensing the storage and sale of dangerous combustible material. The business of the fire marshal is to investigate the causes of fires and to secure the arrest and punishment of incendiaries. The following table gives the number of fires and the loss in each year since 1866:

YEARS.	No. of fires.	Loss.	YEARS.	No. of fires.	Loss.
1863.....	796	\$6,428,000	1871.....	1,258	\$2,127,250
1867.....	873	5,711,000	1872.....	1,681	4,409,000
1863.....	740	4,342,000	1873.....	1,398	2,648,795
1869.....	850	2,626,393	1874.....	1,411	1,328,844
1870.....	964	2,120,212			

—New York is supplied with pure water from Croton river, a small stream in Westchester co., by an aqueduct completed in 1842. A dam was thrown across the river, raising the water 40 ft. and forming Croton lake. The aqueduct proper is constructed of stone, brick, and cement, arched above and below, is about $7\frac{1}{2}$ ft. wide and $8\frac{1}{2}$ high, with an inclination of 13 in. to the mile, and has a capacity of 115,000,000 gallons daily. The water is carried across the Harlem river in cast-iron pipes on a bridge of granite (known as the High bridge), 1,460 ft. long, which is supported by 14 piers, the crown of the highest arch being 116 ft. above high-water mark. High bridge terminates on Manhattan island at 174th street, forms a wide footway, and affords magnificent views. The receiving reservoir in Central park contains 150,000,000 gallons, and the retaining reservoir just above it 1,030,000,000 gallons. The distributing reservoir covers more than four acres on Murray hill, between 40th and 42d streets, fronting on 5th avenue, and holds 20,000,000 gallons. It is divided into two parts, is 45 ft. above the pavements and 115 ft. above tide water, and affords a fine view from the walks that surround it. The length of the aqueduct

from Croton lake to the distributing reservoir is $40\frac{1}{2}$ m. A "high service" reservoir holding 11,000,000 gallons, and a tower to support a tank holding 55,000 gallons, have been constructed in Highbridge park, for supplying the more elevated portions of the city. The water to fill the reservoir and tank is pumped from the aqueduct by powerful engines. The storage reservoir at Boyd's Corners, Putnam co., completed in 1873, will hold 3,000,000,000 gallons. The cost of the works for supplying the city with water to the close of 1874 was \$25,000,000. A water tax is imposed upon the buildings supplied, which in 1874 amounted to \$1,361,857 43, and from 1842 to the close of 1874 to \$24,717,017 50. Measures are in progress for supplying the new wards with Croton water. The number of miles of water pipes laid on Manhattan island in May, 1873, was 370·6; the number of fire hydrants was 3,136. There were laid out on the map of the island 448 m. of streets, roads, and avenues, of which 378 m. were legally opened, 303 m. regulated and graded, and 253 m. paved. For drainage purposes there were 288·54 m. of sewers, 6·02 m. of underground drains, 14·72 m. of culverts, and 3,854 receiving basins. The number of public gas lamps was 18,910; miles of gas mains, 543 $\frac{3}{4}$. The island is supplied with gas by six companies, and the new wards by two companies. Several free floating baths are maintained in summer by the city for the accommodation of the poorer citizens. The number of plans and specifications for new buildings filed in 1874 was nearly 1,300, estimated to cost about \$15,800,000; number of plans submitted for alteration of old buildings, about 1,400; estimated cost, more than \$3,000,000.—The death rate in 1872 was 32·6 per 1,000; in 1873, 29·08; in 1874, 27·59. The number of deaths in the last year was 28,597, of which 9,700 occurred from zymotic, 6,000 from constitutional, 9,900 from local, and 1,766 from developmental diseases, and 1,231 from violence. The chief causes were: smallpox, 466; measles, 317; scarlatina, 895; diphtheria, 1,672; croup, 583; whooping cough, 482; dysentery and diarrhoea, 3,591; cerebro-spinal fever, 151; typhus and typhoid fever, 291; inanition, 301; intemperance, 223; hydrocephalus, 616; consumption, 4,038; tabes mesenterica and marasmus, 579; convulsions, 675; meningitis, 557; bronchitis, 1,039; pneumonia, 2,386; Bright's disease, 814; premature births, 544; accidents and negligence, 996; homicides, 56; suicides, 174. The number of births registered was 25,663; of marriages, 8,397. The actual number of births is at least 35,000 per year, and of marriages probably about 10,500. The number of licenses granted by the board of excise from May 1, 1874, to January, 1875, was 3,827; license fees received, \$263,702 61. The whole number of liquor and lager-beer saloons is estimated at 8,000.—There are 12 public markets now in use, most of which are insignificant in

appearance. They are under the administration of the finance department, and are placed in charge of a superintendent of markets. Stalls are assigned to marketmen upon the payment of fees. Washington market, occupying the block bounded by Greenwich, West, Fulton, and Vesey streets, is the largest, including West Washington market, which is separated from it by West street. On the E. side of South street, opposite Fulton market, which occupies the block bounded by South, Front, Beekman, and Fulton streets, is the great fish depot of the city. Manhattan market, erected by a company in 1871, occupies the block bounded by 34th and 35th streets and 11th and 12th avenues. It is of iron, stone, and Philadelphia brick, and is 800 ft. long, 200 ft. deep, and 80 ft. high in the interior. Only a

small portion of it is in use.—The assessed value of property in 1805 was \$25,645,867. The subsequent valuation and taxation at intervals of five years to 1865 were as follows:

YEARS.	Valuation.	Total tax.	YEARS.	Valuation.	Total tax.
1810	\$25,456,870	.....	1840	\$252,238,515	\$1,354,885
1815	\$1,636,042	\$361,285	1845	230,095,517	2,096,191
1820	69,530,753	339,892	1850	286,061,816	3,230,085
1825	101,160,046	377,449	1855	486,998,278	5,833,823
1830	125,288,518	509,178	1860	577,230,956	9,758,508
1835	218,723,703	965,603	1865	608,784,355	18,202,858

The valuation of real and personal estate, the rate of taxation, and the amount of taxation for state and city purposes, for the last six years, are as follows:

YEARS.	Valuation of real estate.	Valuation of personal estate.	Total valuations.	Rate of tax on \$100.	Total taxation.	Tax paid to state for common schools.	Total taxation for state purposes.	Tax for purposes of the city and county.
1870...	\$742,103,075	\$305,285,374	\$1,047,388,449	\$2 25	\$23,566,240	\$1,089,889 16	\$2,834,501 22	\$20,721,739
1871...	769,806,410	306,947,223	1,076,753,633	2 17	23,361,674	1,100,354 33	4,709,353 82	18,592,320
1872...	797,148,665	306,949,422	1,104,098,087	2 90	32,635,480	1,269,156 70	5,745,049 82	26,290,432
1873...	836,691,980	292,447,643	1,129,139,623	2 50	28,230,996	1,301,567 04	6,117,365 09	22,113,631
1874...	881,547,995	272,481,181	1,154,029,176	2 80	32,312,817	1,350,122 61	7,673,481 70	24,639,335
1875...	881,547,995	272,481,181	1,154,029,176	3 00	34,620,574	1,381,445 86	8,012,386 00	26,608,488

In addition to the amounts paid to the state from taxation, there were paid also in the years 1870, 1871, and 1874, the following amounts derived from stocks, viz.: in 1870, for redemption of state debt, \$2,070,000; in 1871, for the same, \$1,972,602 36; in 1874, for state canal fund deficiency, \$3,899,494 86. The amounts payable to the state for taxes in 1875 are fixed, as shown above; but the valuations, rate of tax, and total amount of taxes to be levied in that year are only approximate. The real value of property in the city is estimated in the United States census of 1870 at \$3,484,268,700. The appropriations for the expenses of the city government during 1875 amount to \$36,956,472 23. The principal items are as follows: state taxes, \$6,630,940 14; common schools for the state, \$1,381,445 86; interest on city debt, \$9,300,000; payment of stocks and bonds falling due, &c., \$1,454,763 33; Fourth avenue improvement, \$1,598,767 50; taxable charities (under acts of legislature), \$825,905; police department, \$3,387,325, including \$3,147,400 for salaries of commissioners and force; fire department, \$1,316,000, including \$897,600 for salaries of commissioner and force; public schools \$3,480,000, including \$2,686,500 for salaries; salaries of subordinates of departments, &c. (except police, fire, docks, and schools), \$1,462,186; salaries of mayor, aldermen, chamberlain, and heads of departments (excepting commissioners of police, fire, and docks), \$229,500; salaries of judiciary, \$897,345; supplies for department of charities and correction, including \$90,000 for outdoor poor, \$841,000; cleaning streets, \$800,000; lamps and gas, \$750,000; maintenance and government of

parks and places (exclusive of salaries), about \$284,000; sheriffs', coroners', jurors', and witnesses' fees, \$162,000; election expenses, \$169,000; college of the city of New York, \$150,000; contingencies of departments, \$147,750; construction, repairs, supplies, and cleaning public offices, \$142,500; printing, stationery, and blank books, \$137,500; repairing and maintaining Croton aqueduct, \$120,000; school moneys to corporate schools, \$103,000; repaving and repairs to stone pavements, \$100,000; judgments, \$100,000; repairing and renewal of pipes, &c., \$80,000; rents, \$75,000; repairing and cleaning sewers, \$75,000; assessments and taxes on corporation property, \$50,000; keeping in order wooden and concrete pavements, \$50,000. The city debt on Dec. 31, 1874, was as follows: funded debt, \$118,241,557 24; temporary debt, \$23,562,200 76; total debt, \$141,803,758; net debt (less sinking fund, \$26,615,778), \$115,187,980. There were also \$208,011 in cash and \$710,106 in bonds and mortgages applicable in reduction of the debt. In addition to the above amounts, there is a floating debt which has been variously estimated at from \$10,000,000 to \$20,000,000. Many of the claims constituting this debt are in litigation. The city with Staten island forms the first military division of the state, and has several well drilled regiments of militia.—The New York post office is by far the most important in the country. Besides the general office, there are on Manhattan island 14 stations, designated by the letters of the alphabet, and 895 street letter boxes. The number of employees is 1,044, viz.: officers in charge of divisions and bureaus, 13; superintendents of stations, 14; clerks, 636; carri-

ers, 381. The following are the average quarterly statistics: receipts, \$693,759 45; expenditures, \$288,229 86; city letters and postal cards delivered, 8,213,064; mail letters and postal cards delivered, 19,846,734; foreign letters received, 1,927,586; foreign letters sent, 2,092,383; domestic mail letters despatched, 25,300,000; newspapers received for delivery and despatch, 27,453,800; registered letters received for delivery, 95,000; registered letters and postage stamp packages forwarded, 125,000; domestic money orders issued, 8,559, amounting to \$193,913 32; domestic money orders paid, 174,291, amounting to \$1,768,668 26; amount of foreign money orders issued, \$592,502 30. In the 23d and 24th wards there are 8 branch offices, under the jurisdiction of the general city post office.—Three commissioners of public charities and correction have charge of paupers and criminals. The institutions under their care, in point of extent and excellence, compare favorably with any in the world. They are situated partly in the city proper, but chiefly on the islands in the East river and on Hart's island. The buildings are substantial and spacious, and the principal ones on Blackwell's island are of granite quarried there by the convicts. In the city are Bellevue hospital, the reception hospitals in the City Hall park (closed) and in 99th street near 10th avenue, the city prison, four district prisons connected with the police courts, the free labor bureau and intelligence office in Clinton place, and the outdoor poor department in the central office of the commissioners, a handsome building on the corner of 3d avenue and 11th street. Bellevue hospital is at the foot of E. 26th street, and contains 35 wards, with accommodations for about 1,200 patients. The buildings, erected at different times, with various changes and additions, now form a continuous line of 350 ft., four stories high, the central one being crowned with a lofty observatory. The grounds, several acres in extent, are finely cultivated. In connection with the hospital a building has been erected for the morgue, in which the bodies of the unknown dead are exhibited for identification. The bureau of medical and surgical relief for the outdoor poor affords aid to applicants who do not require continuous treatment in the hospital. Provision is also made for attendance upon the sick poor at their homes by dividing the city into 11 medical districts and assigning a resident physician to each. The ambulance corps affords prompt relief in case of casualties, the telegraph speedily summoning an ambulance with a competent surgeon. The outdoor poor department affords temporary aid to deserving applicants. The city is divided into 11 districts, for each of which a visitor is appointed, whose duty it is to investigate the circumstances of applicants and report to the superintendent of outdoor poor. The free labor bureau has proved of great value in procuring situations for those out of work. The prisons are for the detention of

those charged with crimes and offences pending the disposition of their cases by the courts, and in the city prison persons under sentence of death are confined until execution. The county jail in Ludlow street is used for the detention and incarceration of persons arrested upon civil process, and also for the detention of persons charged with crimes and offences under United States law; it is under the control of the sheriff. The institutions on Blackwell's island (all under the care of the commissioners) are the almshouse, epileptic and paralytic hospital, charity, smallpox, and typhus fever hospitals, hospital for incurables, convalescent hospital, penitentiary, workhouse, lunatic asylum (for females), and blind asylum. Admission to the almshouse is restricted to the old and infirm destitute, two wards, constituting the blind asylum, being set apart for the blind. The penitentiary is for the confinement of prisoners convicted of misdemeanors, while the workhouse receives those committed for vagrancy and for drunkenness and disorderly conduct. In winter also able-bodied persons who solicit charity are frequently sent to the workhouse. On Ward's island are the inebriate asylum, the soldiers' retreat, and the insane asylum (for males). The soldiers' retreat is a home for invalid soldiers of the late war who served in regiments raised in the city. On Randall's island are the nursery, the infant hospital, and the idiot asylum. These form the juvenile branch of the almshouse. The nursery receives children over four years old whom their parents have abandoned or whom they are unable to support. The children are apprenticed or placed in families for adoption at the expiration of three months, if not reclaimed by their parents, and no child is retained after he has completed his 16th year. There is a hospital connected with the institution. Provision is made for the instruction of the inmates by the board of education. In the infant hospital provision is made for foundlings, orphans, and children attended by indigent mothers; here they are cared for until old enough to be transferred to the nursery, unless adopted or reclaimed by their parents. The idiot asylum has two classes of inmates, the hopelessly imbecile, and those capable of improvement; for the latter a special school is provided. (See *Idiocy*, vol. ix., p. 175.) On Hart's island are the industrial school and the city cemetery for the interment of the pauper and unknown dead; the island comprises about 100 acres, and is situated in Long Island sound, 15 m. from the city hall and 1 m. from the mainland. All except three acres was purchased by the city in 1868. The industrial school is designed for the reformation of vicious boys, who receive instruction and are trained to subordination and labor. There is also under the control of the commissioners of charities and correction a nautical school, conducted on board the school ship *Mercury*, to which boys are transferred from the industrial school;

they receive practice and instruction to fit them for service in the merchant marine or navy. The following table is taken from the latest annual report of the department (for 1871):

INSTITUTIONS.	Number of inmates during the year.	INSTITUTIONS.	Number of inmates during the year.
Bellevue hospital...	7,514	Nursery	2,965
Reception hospital (City Hall park) ..	1,905	Infant hospital.....	2,213
Charity hospital....	5,999	Soldiers' retreat	855
Smallpox hospital...	2,526	Inebriate asylum...	1,718
Typhus fever hospital	252	Idiot asylum	181
Incurable hospital...	177	Relieved by superintendent of out-door poor	19,157
Epileptic and paralytic hospital.....	297	Nautical school.....	681
Lunatic asylum.....	2,023	Industrial school....	942
Nursery hospital....	617	Idiot school	115
Patients treated at home by department physicians...	5,645	City prisons.....	51,466
Patients treated at bureau for out-door sick	17,717	Workhouse	21,182
Alms-house	8,716	Penitentiary	2,368
Blind asylum.....	149	Free labor bureau (employment obtained for).....	43,058
		Total	195,438

The number receiving medical treatment in hospitals or otherwise was 44,672; number of poor relieved in almshouse, asylums, or otherwise, 30,954; number in schools, 1,738; in prisons and reformatories, 75,016. The number of bodies received at the morgue was 214, of which 127 were recognized; number of interments in the city cemetery, 3,502. The current expenses of the various institutions amounted to \$1,063,990, viz.: charitable, \$820,788; correctional, \$243,202. The amount expended in relief to outdoor poor was \$42,776 50 in money and about \$22,500 in coal. The number of inmates in the various institutions on Nov. 15, 1874, was as follows:

INSTITUTIONS.	No. of inmates	INSTITUTIONS.	No. of inmates
City prison	481	Blind asylum	86
Second district prison..	82	Workhouse	1,954
Third district prison..	81	Lunatic asylum	1,215
Fourth district prison..	76	Epileptic and paralytic hospital	114
Fifth district prison...	14	Inebriate asylum	8
Bellevue hospital	695	Soldiers' retreat	246
Reception hospital (park)	81	Insane asylum.....	534
Reception hospital (99th street).....	16	Nursery	629
Charity hospital.....	870	Nursery hospital*	452
Smallpox hospital	16	Infant hospital.....	461
Typhus fever hospital..	93	Industrial school	271
Penitentiary	6	Nautical school	249
Alms-house	917	Convalescent hospital.	293
Incurable hospital	959		
	115	Total	11,198

Besides the city institutions, there are numerous important and well directed charities managed by associations or corporations, some of which receive aid from the city or state. Among them are 21 associations for the relief of the poor; 25 hospitals, of which 15 have commodious buildings; 30 dispensaries, furnishing medicine and medical aid; 13 orphan asylums; more than 50 daily industrial schools, with an average attendance of from 7,000 to 10,000; and more than 100 asylums, homes, lodging

* Including idiot asylum.

houses, and institutions of various kinds. The organized local charitable societies and institutions receive and disburse about \$2,500,000 a year. The New York association for improving the condition of the poor was organized in 1843. Its operations embrace the entire island of Manhattan, which is divided into 371 districts, for each of which a visitor is appointed, these being assisted by an advisory committee of five for each ward. Relief is granted only through the visitor of the district. Articles of food and clothing only are given, and efforts are made to encourage in the recipients industry and virtuous habits. In 1874 the number of families relieved was 24,091, comprising 89,845 persons, at a cost of \$96,431. The whole number of families relieved from the organization of the association was 226,446, comprising 952,868 persons, at a cost of \$1,468,071. The children's aid society (office in E. 4th street) was formed in 1853, to "improve the condition of the poor and destitute children of the city," particularly the newsboys, bootblacks, and other street children. It has established lodging houses, furnished with reading rooms, music, and meals, and industrial schools, in which the children are instructed in the rudiments of learning and in useful occupations. The homeless, after some instruction, are provided with good situations in the west. There are five lodging houses, of which the most noteworthy are the newsboys' lodging house on the corner of Duane and New Chambers streets, and the girls' lodging house in St. Mark's place. The number of industrial schools supported in 1874 was 34 (21 day and 13 night schools); number of pupils enrolled, 10,288 (5,335 boys and 4,953 girls); average attendance, 3,556. The number provided with homes and employment in that year was 3,985; entire number since the organization of the society, 36,363. The American female guardian society and home for the friendless furnishes a temporary asylum for friendless children and destitute young women. The aim of the society is to procure homes for the children, who seldom remain many months in the institution. It supports 11 industrial schools in various parts of the city, with an average attendance of about 1,200 children, and expends annually about \$70,000 in carrying on its operations. The home is a three-story brick building on E. 30th street, with accommodations for about 150 inmates, erected in 1848. In 29th street, immediately opposite the home and connected with it by a bridge, is a four-story brick edifice in the Romanesque style, erected in 1856, containing the chapel, the school for the inmates of the home, an industrial school, and the offices of the society. The society itself was organized more than 40 years ago. The society for the reformation of juvenile delinquents was incorporated in 1824. The house of refuge under its control is situated on the S. portion of Randall's island, and has 30 acres of land connected with it. The buildings are of brick in the Italian style, the

two principal structures presenting a graceful façade nearly 1,000 ft. long. They contain 886 dormitories, school rooms, hospital departments, dining halls, &c., offices, and a chapel capable of seating 1,000 persons. In the rear are the workshops, each 30 by 150 ft. and three stories high. The society receives for instruction, discipline, and reformation youth who are brought before the courts for petty offences. The boys and girls are kept in separate buildings, and the older of the latter who have been guilty of social crime are carefully separated from the more youthful. They are required to work from six to eight hours a day, and to study from four to five hours. The period of detention depends upon their conduct, and upon their discharge situations are procured for the deserving. The number of inmates received to the close of 1872 was 14,675. The number in the institution during 1874 was 1,367; remaining at the close of the year, 789 (677 boys and 112 girls). The Bloomingdale asylum for the insane, in 117th street, between 10th and 11th avenues, was opened in 1821. The grounds embrace 45 acres, partly devoted to gardening and containing a great variety of trees and ornamental shrubbery. The asylum buildings, three in number, are capable of accommodating about 170 patients, and are always full. Patients are received from any part of the state, and are required to pay from \$8 to \$30 a week according to their circumstances. About 300 acres of land have recently been purchased at White Plains, Westchester co., with a view of removing the institution to that place at some future day. The Bloomingdale asylum is a branch of the New York hospital, and is chiefly managed by a committee of its board of governors. The hospital was chartered in 1771, and for many years the buildings in Broadway, between Duane and Worth streets, were open for the care of the sick and injured. The site was leased in 1869, and the following year the institution was closed. It has a fine library and pathological cabinet at No. 8 W. 16th street, open for consultation and examination without charge. A new hospital is soon to be erected in 15th street, in the rear of the library. The woman's hospital of the state of New York was opened in 1855 for the purpose of putting in practice the discoveries of Dr. J. M. Sims (made public in 1852) in the treatment of the diseases of women. The building now occupied, on 4th avenue and 50th street, was opened in 1867. It is a handsome structure, the basement being of polished stone and the four additional stories of brick, with angles and pilasters ornamented with finely wrought vermiculated blocks. It contains 75 beds, and cost with furniture \$200,000. The upper floor is devoted to charity patients, the others to pay patients. The New York asylum for lying-in women, in Marion street, was erected in 1830, though the society which established it was organized in 1822. It is entirely free. Only

virtuous, indigent women are admitted, but physicians are appointed by the society to attend such as apply and are not admitted. Since the opening of the asylum about 4,000 inmates have been received, and more than 13,000 outdoor patients have been treated. The New York institution for the instruction of the deaf and dumb was incorporated in 1816. It was originally situated in 50th street, but was removed in 1856 to Washington Heights, 9 m. N. of the city hall, where it has 28 acres of land overlooking the Hudson. The buildings, which are the largest and finest of the kind in the world, cover about two acres, and are of brick, with basement, copings, and trimmings of granite. The front walls, which are panelled, are faced with yellow Milwaukee brick. The main edifice, which contains the offices, library, &c., is flanked by two wings, one devoted to the male and the other to the female pupils. Another building contains the chapel, dining room, &c., and a brick structure has recently been erected for the accommodation of the mechanical department. More than 500 pupils can be accommodated, and about 2,300 have been educated since the opening of the institution. The library contains 2,860 volumes, some of which are rare books on deaf-mute instruction. Deaf mutes are received at the charge of the state or counties, and also as pay pupils. The institution for the improved instruction of deaf mutes, in 7th avenue near 44th street, was organized in 1867. It has received some aid from the state, and in 1870 a grant of land on the W. side of Lexington avenue, between 67th and 68th streets, was made to it by the city, where buildings are to be erected. Instruction is imparted by the method of articulation. The New York institution for the blind was incorporated in 1831, and the school was opened at No. 47 Mercer street the next year. The present site was purchased a few years subsequently, and comprises a plot 200 by 800 ft. fronting on 9th avenue between 33d and 34th streets. The building is of marble, three stories high with Mansard roof, presenting a façade of 175 ft. with a north and a south wing of 125 ft. each. Indigent blind from the city and from Long and Staten islands are educated at the expense of the state, and pay pupils are also received at \$300 a year. About 94 per cent. of those instructed have been state pupils. The number under instruction in 1874 was 193; remaining at the close of the year, 173. The New York juvenile asylum was incorporated in 1851. The buildings now occupied are on a plot of 25 acres, in 176th street, near the High bridge, and consist of a central five-story structure, skirted by two wings of four stories each, with rear extensions and appropriate outbuildings. They are of stone quarried on the premises, and were opened in 1856. A three-story brick edifice, 42 by 108 ft., has recently been erected to accommodate the class rooms, gymnasium, swimming bath, and industrial depart-

ment. The grounds occupy a lofty eminence, and are laid out in gardens and shaded walks, drives, and play grounds. The libraries contain about 2,000 volumes. The inmates are between 5 and 14 years old, and consist of truant and disobedient children placed in the institution by their parents for discipline or committed by the magistrates for reformation, and of the friendless and neglected committed as vagrants. They are required to work a portion of the day, and also receive literary instruction. But few remain more than six months, the plan of the institution contemplating the early return of the inmates to their parents, or their indenture to families in the west. The number of children received to the close of 1874 was 17,772. There is a house of reception in W. 13th street, with accommodations for 130 children, and the greater part are retained here a few weeks before being admitted to the asylum. The New York orphan asylum, on the bank of the Hudson between 73d and 74th streets, is a fine Gothic building 120 by 60 ft., with two spacious wings and about nine acres of land. The society was organized in 1806 by ladies, and is supported by private donations. It has purchased 37 acres of land at Hastings on the Hudson, and contemplates moving the asylum thither. The Leake and Watts orphan house, near 112th street and 10th avenue, is a large and handsome edifice, delightfully situated in a plot of 120 acres. It has a permanent income, and supports an average of about 120 orphans. The colored orphan asylum was incorporated in 1838. The present beautiful building, occupying a fine plot of ground at 143d street and 10th avenue, was completed in 1868. It is of brick, three stories high with basement, with a frontage of 234 ft. and a depth of 125 ft., surmounted by three unique octagonal towers, and has accommodations for more than 300 children. The colored home was organized about 1840. The grounds on 1st avenue, between 64th and 65th streets, were purchased in 1848. The buildings form a hollow square, with a fine flower garden in the centre. The institution consists of four departments, the home for the aged and indigent, the hospital, the nursery, and the lying-in department, and annually cares for about 1,000 persons. The union home and school for the maintenance and instruction of the children of volunteer soldiers and sailors, incorporated in 1862, is finely situated at 151st street and the Boulevard. The Five Points mission in Park street, and the Five Points house of industry in Worth street, have been instrumental in reforming that locality (so called from the converging of three streets), which 25 years ago was the worst in the city, crowded with the degraded and criminal. The mission was established in 1850, and the building was opened in 1853. It supports a day school, with an average attendance of from 400 to 500, a Sunday school, and a free library and reading room. The scholars

are clothed by the society, and receive a daily lunch. More than 2,000 children have been placed in good homes, and many thousand adults have been furnished with situations. The house of industry had its origin soon after the establishment of the mission, and was designed to furnish employment to women desirous of escaping from an abandoned life. It was incorporated in 1854. The buildings now occupied were partly erected in 1856 and partly in 1870. The school rooms have accommodations for 500 scholars, and the dormitories for more than 300 beds. Meals are furnished to the poor, and other forms of charity administered in the neighborhood. The New York Catholic protectory, incorporated in 1863, receives children of Roman Catholic parents committed by the magistrates for reformation. It is situated at West Chester just across the city line, and has extensive grounds and fine buildings. The number of inmates on Sept. 30, 1874, was 1,842; whole number in the institution during the year ending on that date, 2,877; entire number since its opening, 8,771. The Howard mission and home for little wanderers, in New Bowery, in the midst of one of the most wretched quarters of the city, was established in 1861. It supports day and Sunday schools, and a home for needy children, and distributes food, clothing, and fuel to the deserving poor. The prison association of New York was organized in 1844, for the purpose of aiding discharged convicts to reform and obtain employment, of befriending persons charged with crime, and of studying the subject of prison discipline. The women's prison association of New York, an outgrowth of this, maintains a home at No. 110 Second avenue. Other institutions, most of which own spacious and handsome buildings, are the Chapin home for the aged and infirm, in E. 66th street; Baptist home for the aged and infirm, in E. 68th street; home for aged Hebrews, in Lexington avenue and 63d street; young women's home, in Washington square; home for women and mission, in Water street; Wilson industrial school, at Avenue A and 8th street; Catholic home for the aged poor, in W. 32d street; Sheltering Arms, for destitute and helpless children, in 129th street and 10th avenue; St. Luke's hospital (Episcopal), in 5th avenue and 54th street; German hospital, in 4th avenue and 77th street; Mt. Sinai hospital (Jewish), in Lexington avenue and 66th street; nursery and child's hospital, with lying-in asylum, in Lexington avenue and 51st street; New York eye and ear infirmary, in 2d avenue and 13th street; institution for the relief of the ruptured and crippled, in Lexington avenue and 42d street; house of rest for consumptives, at Tremont; New York infirmary for women and children, in 2d avenue near 8th street, to be removed to Livingston place; New York ophthalmic hospital, in 23d street and 3d avenue; New York ophthalmic and aural hospital, in E. 12th street; Manhattan eye and ear

hospital, in E. 34th street; old ladies' home of the Methodist Episcopal church, in W. 42d street near 8th avenue; home for incurables, at West Farms; Presbyterian home for aged women, in E. 73d street; St. Francis's hospital (Roman Catholic), in 5th street; Episcopal orphan home and asylum, in E. 49th street; Roman Catholic orphan asylums, in Prince street and 5th and Madison avenues; asylum of the New York Magdalen benevolent society, in 5th avenue and 88th street; half orphan asylum, in W. 10th street; house of mercy, for the reformation of fallen women, in 86th street near the Hudson; Hebrew orphan asylum, in 77th street and 3d avenue; orphan asylum of St. Vincent de Paul (Roman Catholic), in 39th street near 7th avenue; Catholic foundling asylum, in 68th street near Lexington avenue; Roosevelt hospital, in 59th street and 10th avenue; Presbyterian hospital, in 70th street and Madison avenue; home for aged and infirm deaf mutes, in E. 13th street; home for the blind, in W. 14th street; asylum for female deaf mutes (Roman Catholic), at Fordham; association for the relief of respectable aged indigent females, in E. 20th street; St. Luke's home for indigent Christian females, in Madison avenue and 89th street; St. Vincent's hospital (Roman Catholic), in 11th street and 7th avenue; St. John's guild, in Varick street; seamen's fund and retreat, with a hospital for seamen on Staten island, and connected with it an asylum for destitute, sick, and infirm families of seamen; sailors' snug harbor, a retreat for superannuated seamen, also on Staten island; marine society; and ladies' home missionary society. There are about 25 Roman Catholic convents and associations of a similar class. The most prominent are the convent of the Redemptorists or congregation of the Most Holy Redeemer, in 3d street; the congregation of the missionary priests of St. Paul the Apostle (Paulists), in 9th avenue and 59th street; the mother house of the sisters of charity, at Mt. St. Vincent, on the Hudson, near the border of Yonkers; the convent and academy of the ladies of the Sacred Heart, at Manhattanville; St. Catharine's convent of the sisters of mercy, in E. Houston street, which has a house of mercy (refuge for young females) connected with it, an industrial school in Madison avenue and 81st street, and three academies; and the convent of the sisters of the Good Shepherd, in 90th street near the East river, with a house for the reformation of fallen women.—The New York city mission and tract society was established in 1827, and reorganized and incorporated in 1866. It employs 30 missionaries, has six mission stations, ten mission chapels, and five mission Sabbath schools, and distributes considerable aid to the poor. Since 1835 it has expended \$850,000 in regular missionary work, besides more than \$100,000 in building mission stations and chapels, and has distributed 41,295,893 tracts in English and

some ten other languages. The total expenditures in 1874 were \$49,452. The young men's Christian association was formed in 1852. The elegant building in 23d street and 4th avenue was erected in 1868-'9, at a cost of \$345,000, the cost of the lots having been \$142,000. It is 87 by 175 ft., and five stories high, with a central and three angular towers, and is constructed chiefly of Ohio freestone and New Jersey brown stone. This edifice contains a hall capable of seating 1,500 persons, a lecture room with seats for 400, a gymnasium, a bath room, a free reading room supplied with the principal American and foreign newspapers and periodicals, a library, and rooms for evening classes in modern languages, penmanship, bookkeeping, &c. The association has several branches in different parts of the city. The American Bible society, next to the British and foreign the largest in the world, was founded in 1816. It has printed the Bible in 29 languages and dialects, besides assisting in publishing and circulating many of the 185 versions of the British and foreign Bible society. It employs 500 hands, and carries on every branch of its business in the Bible house, erected by the society in 1853 at a cost including ground of more than \$300,000. This edifice is of brick, six stories high, and occupies the entire block bounded by 3d and 4th avenues and Stuyvesant and 9th streets, covering with the area in the centre three fourths of an acre. It contains the offices of the American board of commissioners for foreign missions, the New York association for improving the condition of the poor, the New York city mission and tract society, and many other benevolent and religious organizations. Reading rooms for seamen and working men have been established in various parts of the city by the different missionary organizations. There are numerous temperance societies and lodges of freemasons, odd fellows, and many similar orders.—The public schools are under the general management of the board of education, consisting of 21 commissioners of common schools appointed by the mayor for a term of three years (seven retiring annually). There are also three inspectors of common schools for each of the eight school districts into which the city is divided, appointed by the mayor for three years (one retiring annually), and five trustees for each ward chosen by the board of education for five years (one retiring annually). These officers receive no salary. The board of education appoints a city superintendent of schools and several assistants for a term of two years, a superintendent of school buildings, an engineer, and other officers. The schools are free to all between the ages of 4 and 21 years. The common schools are divided into primary schools with six grades, and grammar schools with eight grades. Besides the ordinary English branches, drawing is taught in all the grades of the grammar schools, and instruction in French may be given in the two

higher grades upon the application of the trustees of the ward. German is taught as a part of the regular course in all the grades of the grammar schools in any ward, when in the opinion of the trustees a sufficient number of parents or guardians desire it. Instruction in vocal music is given in the primary grades. Evening schools are opened during the autumn and winter for those whose ages or avocations prevent them from attending the day schools. There is also an evening high school for males, in which Latin, modern languages, and the higher English branches are taught. The normal college is intended especially for the training of teachers for the common schools, and only pupils of the female grammar schools who have completed the studies of the first grade are admitted. The faculty consists of five professors, viz.: of intellectual philosophy, Latin and English, physics and chemistry, French and German, and natural science. Each professor has the requisite number of assistants, and there are also a lady superintendent and teachers of music, drawing, mathematics, history, methods of teaching, calisthenics, and penmanship. The course comprises six grades, occupying three years. A model school is connected with the college. Saturday sessions are held for those employed in the common schools. The separate colored normal school has been discontinued. At the close of 1874 the United States sloop of war *St. Mary's* was placed at the disposal of the board of education by the government for the establishment of a nautical school. Boys in the public schools who manifest a desire to follow a seafaring life are to be admitted. A number of corporate schools connected with asylums and charitable institutions have, under various acts of the legislature, been entitled to a share of the school moneys, and subject to the supervision of the board of education. The following table is for the year 1873:

GRADE.	Number of schools.	Number of teachers.	Pupils enrolled.	Average attendance.
Normal college	1	88	1,468	816
Model primary school	1	7	412	256
Saturday normal school	1	*	483	344
Colored normal school	1	1	14	9
Grammar schools	95	1,014	61,681	32,822
Primary schools and departments	93	1,193	129,569	56,895
Colored schools (5 grammar and 4 primary)	9	43	2,134	813
Total day schools	201	2,296	195,711	91,455
Evening schools	27	350	17,723	8,125
Evening high school	1	25	1,406	902
Colored evening schools	3	8	421	130
Total evening schools	31	383	19,550	9,160
Total public schools	223	2,679	215,261	100,615
Corporate schools	17	....	21,192	8,780
Aggregate	249	2,679	236,543	109,395

* Included with those of the normal college.

Besides those enumerated there were 192 teachers of special branches. The teachers in the evening schools are nearly all taken from among those of the day schools. The total expenditures during the year named amounted to \$3,479,011, of which \$2,392,829 35 was for salaries of teachers and janitors, \$79,562 20 for salaries of employees of the board of education, superintendents, &c., \$44,847 72 for rent of school premises, \$181,645 96 for supplies for the schools (books, stationery, &c.), \$100,261 58 for fuel, \$26,558 65 for gas, \$96,285 27 for apportionment for corporate schools, \$271,589 65 for erecting and furnishing new buildings, and the rest for miscellaneous purposes. The value of school buildings belonging to the city was \$5,647,000; of lots, \$3,045,000. The number of schools, attendance, &c., in 1874, including the new wards, were as follows:

GRADE.	No. of schools	No. of male teachers.	No. of female teachers.	No. of pupils enrolled.	Average attendance.	No. of school buildings.	Accommodation.
Day schools	224	263	2,574	208,313	97,625	124	128,759
Evening "	37	163	227	21,358	9,170	...	.....
Total public schools..	261	426	2,801	229,671	106,795	124	128,759
Corporate schools...	43	3	74	22,689	8,612	43	13,888
Aggregate	304	429	2,875	252,360	115,407	167	142,642

Fifteen of the public school buildings were rented. The evening schools are held in the day school buildings. Many of the buildings are lofty and elegant structures, finely arranged for school purposes. The normal college, at 69th street and 4th avenue, completed in 1873, is unsurpassed in its accommodations and appliances by any similar edifice in the country. It is in the secular Gothic style, with a lofty and massive Victoria tower; is 300 ft. long, 125 ft. wide on 4th avenue, 78 ft. wide in the rear, and 70 ft. high. It contains 30 recitation rooms, three large lecture rooms, a calisthenium, a library, six retiring rooms for instructors, president's offices, and a main hall capable of seating 1,600. Each recitation room contains seats for 48, and each lecture room for 144 persons. The entire cost of the building was \$350,000, and of the furniture and other appliances about \$40,000. The model school in the rear, fronting Lexington avenue, accommodates 900 pupils. The college of the city of New York occupies a handsome edifice at 23d street and Lexington avenue, 125 by 80 ft. and four stories high. It was organized as the free academy in 1848, empowered to confer degrees in 1854, and incorporated as a college in 1866. It is under the control of a board of trustees, consisting of its president and the members of the board of education *ex officio*, and is supported by the city. Students are admitted who have passed the highest grade of the grammar schools. The full course com-

prises five years, the first year being introductory. Students may choose between the ancient course, with Latin, Greek, and a mod-

and surgeons. The law school is in Great Jones street and Lafayette place. The college of physicians and surgeons has a valuable physiological museum. It was founded in 1791, chartered in 1807, and became connected with Columbia college in 1860. The building, in 4th avenue and 23d street, is of brick and rather plain in appearance. The university of the city of New York, a Gothic white freestone structure in Washington square, 180 by 100 ft., four stories high, with octangular five-story turrets at the angles, was founded in 1831. It has a department of arts and a department of science, in which instruction is free. A school of art is connected with the scientific department.



Normal College.

ern language, and the modern course, with French, German, and Spanish, or Latin instead of German or Spanish. The other studies are the same in both courses and similar to those of other colleges. In the introductory class there is a commercial course for students intending to remain but one year. The degree of bachelor of arts is conferred upon those who complete the ancient course, and that of bachelor of science upon those who complete the modern course. There are professorships of philosophy; of English, Latin, Greek, French, German, and Spanish language and literature respectively; of history and belles-lettres; of mathematics; of mechanics, astronomy, and engineering; of chemistry and physics; of natural history, physiology, and hygiene; and of descriptive geometry and drawing. The library contains 22,000 volumes, and the repository 9,500 text books. In 1874-'5 there were 14 professors, 20 other instructors, and 824 students, viz.: introductory class, 479 (collegiate course 238, commercial course 241); freshmen, 145; sophomores, 102; juniors, 63; seniors, 35. Of the 345 students in the collegiate classes, 197 were pursuing the ancient and 148 the modern course. The expenditures in 1874 amounted to \$162,116 47, of which \$128,815 86 was for salaries of instructors and janitors, and \$6,548 31 for books and supplies for students.—Of the institutions of learning not connected with the city government, Columbia college (Episcopal), the oldest college in the state, situated on Madison avenue and 50th street, is the most prominent. (See COLUMBIA COLLEGE.) Connected with it are a school of mines, a law school, and the college of physicians

There are also law and medical departments; the latter is conducted in E. 26th street, opposite Bellevue hospital. Graduates of the law department as well as of the Columbia college law school are admitted to the New York bar without examination. The number of students in all departments of the university in 1873-'4 was 426, of whom 122 were matriculated students in the departments of arts and science, and 15 were art students. The faculty of instruction consisted of 33 professors, 4 adjunct professors, and 6 assistants, besides the chancellor. St. John's college, at Fordham, has been described in the article FORDHAM. The college of St. Francis Xavier, in W. 15th street, has besides the usual curriculum post-graduate, grammar, commercial, and preparatory departments. It was organized in 1847 and chartered as a college in 1861. Manhattan college, near 131st street and the Boulevard, embraces collegiate, commercial, and preparatory courses. These three are Roman Catholic institutions, Manhattan college being under the direction of the Christian Brothers, and St. John's and St. Francis Xavier of the Jesuits. Rutgers female college occupies a handsome edifice in 5th avenue, opposite the distributing reservoir. It has collegiate, academic, and primary departments. It was established in 1838 and chartered as a college in 1867. St. Louis college (Roman Catholic) occupies a fine building in W. 42d street, and is under the direction of the fathers of mercy. It affords various grades of instruction from the kindergarten to the collegiate. The classics hold a secondary place in its curriculum, special attention being paid to modern languages. There

are two extensive theological seminaries in the city. The first, known as the general theological seminary of the Protestant Episcopal church in the United States, was established in 1819 at New Haven, Conn., soon after removed to New York, and chartered by the legislature in 1822. It occupies two substantial stone buildings, 50 by 110 ft., in 9th avenue and 20th street. The Union theological seminary (Presbyterian) was founded in 1836, chartered in 1839, and is open for students from every denomination of Christians; but the applicant must be a member in good standing of an evangelical church, and a graduate from college, or able to pass an examination in the usual college branches. The course of study occupies three years. The edifice, of plain brick, is in University place, near Washington square; it contains a chapel, four lecture rooms, a library, and private rooms for about 80 students. A new site was purchased some years since in the upper part of the island, but the directors, desiring a more central situation, have appointed a committee to secure another, which has not yet reported. Besides those already named, there are six medical colleges, a

dental college, and a college of pharmacy, viz.: Bellevue hospital medical college; the homœopathic medical college of the state of New York, 3d avenue and 23d street; the New York medical college and hospital for women, 2d avenue and 12th street; the woman's medical college of the New York infirmary for women and children; Eclectic medical college, admitting both sexes, 26th street between 2d and 3d avenues, with a medical dispensary; New York free medical college for women, in St. Mark's place, with a free dispensary; New York college of dentistry, in 2d avenue near 23d street, with a museum and an infirmary for the treatment of the indigent; and the college of pharmacy of the city of New York, in the university building. The New York college of veterinary surgeons, in Lexington avenue, is the only institution in the United States specially devoted to veterinary education. It was incorporated in 1857, but did not go into operation till 1864. It has a hospital connected with it, and a museum containing more than 1,500 valuable specimens. The following table embraces the latest statistics of the different collegiate and professional institutions:

INSTITUTIONS.	Date of incorporation.	Number of instructors.	Number of students.	Volumes in libraries.
Columbia college (academic department).....	1754	15	151	17,500
Columbia college (school of mines).....	1864	24	201	4,600
University of the city of New York (departments of arts and science).....	1831	15	137	4,500
St. John's college.....	1846	26	186	17,000
College of St. Francis Xavier.....	1861	27	479	16,000
Manhattan college.....	1863	48	694	10,000
Rutgers female college.....	1867	13	100	6,000
St. Louis college.....	.....	15	115	1,500
General theological seminary.....	1822	6	73	15,000
Union theological seminary.....	1839	11	117	83,000
Columbia college law school.....	1858	3	438	4,000
University of the city of New York (law department).....	1859	5	82	2,500
College of physicians and surgeons (medical department of Columbia college).....	1807	26	421	1,200
University of the city of New York (medical department).....	1837	22	257	.....
Bellevue hospital medical college.....	1861	29	472	.....
Homœopathic medical college of the state of New York.....	1860	19	102	.....
New York medical college and hospital for women.....	1863	16	25	.....
Woman's medical college of the New York infirmary for women and children.....	1864	20	37	.....
Eclectic medical college.....	1865	11	33	.....
New York free medical college for women.....	1871	14	62	.....
New York college of dentistry.....	1865	9	68	.....
College of pharmacy of the city of New York.....	1831	4	135	1,000
New York college of veterinary surgeons.....	1857	8	...	.....

The Catholics have about 30 select schools and academies, with from 2,500 to 3,000 pupils, and 56 parochial schools, with about 28,000 pupils. There are numerous other denominational and private schools. The oldest school in the city is that of the Reformed (Dutch) church, in W. 29th street, founded in 1633. Trinity school (Episcopal), in 7th avenue, was founded in 1709. The Cooper union for the advancement of science and art (see COOPER, PETER) occupies a fine edifice of six stories, 195 ft. on 4th avenue, 143 on 8th street, 155 on 3d avenue, and 86 on 7th street, costing \$650,000. In the basement is a large lecture room 125 ft. by 82, and 21 ft. high, in which many political and other public meetings are held. The building contains a free library; a free reading room, with more than 300 American and foreign

newspapers and periodicals; free schools of art, wood engraving, photography, and telegraphy for women; a free night school of art for men; and a free night school of science for both sexes. Free lectures are given by distinguished scientific men in the large hall every Saturday evening during the winter. The professors of science may be consulted without cost by inventors or manufacturers of new processes. The number of instructors connected with the institution in 1873-'4 was 19; number of pupils admitted to the art school for women, 201; school of wood engraving, 39; school of telegraphy, 120; night school of science, 1,160; night school of art, 1,505. The Cooper union, or Cooper institute as it is commonly called, was opened in 1859, and the amount expended in carrying on its various

departments to the beginning of 1874 was \$529,394 72, the greater portion of which was raised by renting parts of the building. There are a number of commercial colleges and musical conservatories and schools.—The American institute was incorporated in 1829, and is de-

signed for the promotion of agriculture, commerce, manufactures, science, and the arts. It has a valuable library in the Cooper institute, where its meetings are held. Fairs are held annually in October under its auspices in the capacious building in 3d avenue and 63d street, which attract great numbers of visitors. At the close, premiums and medals are awarded to exhibitors. The American geographical society, also in the Cooper institute, was organized in 1852. It has a valuable library of works devoted to geographical science and a collection of 2,000 maps and charts. The New York historical society, in 2d avenue and 11th street, founded in 1804, has a library particularly rich in American history, and possesses the Abbott collection of Egyptian antiquities, the Lenox collection of Nineveh sculptures, a fine gallery of paintings, &c. The lyceum of natural history, in Madison avenue, besides a good library, has a collection of 3,000 specimens of plants. The American museum of natural history, in Central park, was incorporated in 1869. Its collections embrace Indian antiquities, minerals, shells, and stuffed and mounted specimens of animals, birds, fishes, insects, &c. It has a library comprising 1,000 volumes of rare conchological and scientific works. It is open to the public, except on Mondays and Tuesdays, which are reserved for special students and the teachers and pupils of the public schools. The metropolitan museum of art,

in W. 14th street, besides a gallery of paintings by the old masters, contains the Cesnola collection of Cypriote antiquities, and collections loaned by wealthy citizens, embracing modern pictures and statuary, pottery and porcelain, arms and armor, mediæval manuscripts, antique and mediæval curiosities, and various articles of *vertu*. Admission is free on Mondays; on other days a small fee is charged. The national academy of design, founded in 1826, occupies a unique building of gray and white marble and blue stone in 23d street and 4th avenue. It has a collection of paintings, and in spring and summer gives exhibitions of recent works of American artists. It also maintains free schools for advanced students in art.—Booth's theatre, in 23d street and 6th avenue, is a fine capacious edifice, built of Concord granite in the renaissance style, 149 ft. long



Academy of Design.

and 99 ft. high, including the Mansard roof of 24 ft. The Grand opera house, in 8th avenue and 23d street, is a handsome white marble structure in the Italian order, 113 by 98 ft., and 80 ft. high from base to cornice. The Lyceum theatre, in 14th street near 6th

avenue, has a handsome front and portico in the classical style. In all of these general dramatic representations are given. The other theatres have little architectural attraction, but many of them are capacious and elegantly furnished. The leading comedy theatres are Wallack's, in Broadway and 13th street; the



Booth's Theatre.

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Union Square, near it; and the Fifth Avenue, in 28th street near Broadway. Niblo's theatre, in Broadway near Prince street, has been devoted in recent years chiefly to spectacular pieces. Miscellaneous dramas are represented at Wood's museum, Broadway near 30th street, the Park theatre, Broadway near 22d street, and the Bowery, in the Bowery near Canal street; German plays in the Stadt and Germania theatres, the former in the Bowery near Canal street, and the latter in 14th street near 3d avenue; varieties in Tony Pastor's opera house, Bowery near Spring street, and Theatre Comique, Metropolitan, Olympic, and Globe theatres, all in Broadway between Broome street and Astor place; and minstrelsy in Bryant's opera house, 23d street near 6th avenue, and San Francisco minstrel hall, Broadway near 29th street. The academy of music, in 14th street and Irving place, is devoted chiefly to grand opera; and Steinway hall, nearly adjoining it, is used for concerts and lectures. The square bounded by 4th and Madison avenues and 26th and 27th streets is occupied by the hippodrome, erected and opened by P. T. Barnum. In the Central Park garden, 7th avenue and 59th street, concerts are nightly given during the summer, to audiences of from 1,000 to 2,500 persons, by Theodore Thomas's orchestra of 50 performers. In the Bowery are numerous German gardens, the largest and most popular of which is the Atlantic, near Canal street, where from 1,000 to 1,500 Germans nightly listen to orchestral music and drink beer. The Tivoli, in 8th street near 3d avenue, and Terrace garden, in 58th street near 3d avenue, are also places of popular resort, chiefly for Germans. The leading clubs are the Union (founded in 1836), the Travellers' (1865), and the Knickerbocker in 5th avenue, the Army and Navy (1871) in W. 27th street, and the New York at the junction of Broadway, 5th avenue, and 25th street, chiefly social; the Century (1847) in E. 15th street near Union square, the Lotos (1870) in Irving place, the Arcadian (1871) in Union place, literary; the Palette (1869) in E. 22d street, composed of artists; the Union League (1863), occupying a fine building in Madison avenue and 26th street, and the Manhattan (1864) in 5th avenue, political, the former republican and the latter democratic; and the New York Yacht club (1844) and the American Jockey club, in Madison avenue and 27th street, sporting, the latter having a house at Fordham. The Union League club was organized during the civil war, and was active in aiding the federal cause.—The Astor library, in Lafayette place, was founded by a legacy from John Jacob Astor in 1848; it is for study and reference, no books being taken away. (See ASTOR LIBRARY.) The mercantile library in Astor place, and the apprentices' library in Broadway, both established in 1820, and the society library in University place, organized in 1754, are lending libraries, and have reading rooms supplied with the principal

American and foreign magazines and newspapers. The privileges of the mercantile library are obtained by the payment of small annual dues. The society library occupies a building 70 by 100 ft. It belongs to shareholders, but others are entitled to its privileges upon the payment of periodical dues. The apprentices' library belongs to the "General Society of Mechanics and Tradesmen of the City of New York." It is free to apprentices; other persons are required to pay small annual dues. The principal law libraries are that of the New York law institute in Chambers street, accessible to members of the bar on payment of an initiation fee and annual dues, and that of the "Association of the Bar of the City of New York" in W. 27th street, incorporated in 1871. The city library in the city hall, free to all, is a collection consisting chiefly of the city documents and the laws and ordinances of other cities. The Mott memorial free medical and surgical library, in Madison avenue, was founded by the widow of Dr. Valentine Mott, and comprises his medical library of 2,000 volumes, 800 volumes contributed by Dr. Alexander B. Mott, and other donations and purchases. The other principal libraries of a public character are the eclectic (circulating), in 17th street near Irving place; the printers' free library, in Chambers street; the woman's library, in Bleecker street, belonging to the working women's protective union; that of the "New York Medical Library and Journal Association," in E. 28th street; the Harlem library; and the Washington Heights library. There are also a number of circulating libraries, consisting chiefly of novels. The number of volumes in the various libraries not connected with institutions of learning is as follows:

LIBRARIES.	Vol- umes.	LIBRARIES.	Vol- umes.
Astor.....	148,000	New York hospital..	9,720
Mercantile	148,000	Bar association.....	8,000
Society.....	64,000	Harlem.....	6,090
Apprentices'.....	50,000	Lyceum of natural	
Historical society.....	40,000	history.....	5,000
Eclectic.....	30,000	City.....	4,000
Law institute.....	17,500	Mott memorial.....	4,000
Cooper union.....	12,600	Medical library and	
Geographical society.....	11,000	journal association	8,545
American institute....	10,704	Printers'.....	8,500
Young men's Chris- tian association.....	10,000	Woman's.....	8,000
		Washington Heights.	2,565

The Lenox library (free), founded by James Lenox, a wealthy citizen, was chartered in 1870. A splendid building of Lockport limestone has been erected by Mr. Lenox, occupying the entire 5th avenue front between 70th and 71st streets, facing Central park; but the library has not yet been opened. It is to receive the "collection of manuscripts, printed books, engravings and maps, statuary, paintings, drawings, and other works of art" made by the founder, and particularly rich in early American history, Biblical bibliography, and Elizabethan literature. Other donations have

been made to the trustees, of which the most important is that of Felix Astoin, comprising about 5,000 French works.—The latest statis-

of Second Adventists and four of Spiritualists. There are 356 Protestant (evangelical) Sabbath schools, with 88,237 scholars enrolled, and an average attendance of 56,167, and 62 Catholic, Jewish, &c., Sabbath schools, with 27,589 scholars enrolled, and an average attendance of 18,274.—The press of New York in numbers and influence takes the lead in the United States. The number of newspapers and periodicals, according to Rowell's "American Newspaper Directory" for 1874, was 398, besides 10 semi-weekly and 20 weekly editions of daily papers, viz.: daily, 28 (including 6 German, 2 French, and 1 Swedish), of



Lenox Library.

tics of churches are contained in the table below, besides which there are 25 or 30 in the new wards:

DENOMINATIONS.	Number of organizations.	Number of missions.	Number of edifices.	Number of sittings.	Value of edifices.
Baptist*.....	33	13	30	23,000	\$1,705,000
Congregational.....	4	4	3	2,500	450,000
Disciples.....	1	0	1	600	26,000
Evangelical.....	1	0	1	750	87,000
Friends.....	3	3	3	2,000	375,000
German Evangelical Reformed.....	1	0	1	700	32,500
Jewish.....	27	0	17	13,650	1,545,000
Lutheran.....	14	7	12	15,000	425,000
Methodist Episcopal.....	49	13	44	40,000	2,161,500
Methodist Episcopal African.....	5	0	4	8,000	120,000
Methodist Protestant.....	1	0	1	750	85,000
Methodist, Welsh Calvinistic.....	1	0	1	750	28,000
Methodist, Free.....	1	0	1	800	47,000
Moravian.....	1	1	2	1,500	84,000
Presbyterian.....	43	27	53	55,000	4,550,000
Presbyterian, Reformed.....	4	3	3	2,500	105,000
Presbyterian, United.....	7	1	6	4,500	275,000
Protestant Episcopal.....	66	26	80	60,000	7,500,000
Reformed.....	15	6	21	20,000	2,320,000
Roman Catholic.....	40	0	40	56,000	5,400,000
Swedenborgian.....	1	0	1	750	100,000
Unitarian.....	3	2	2	3,500	400,000
Universalist.....	3	4	3	3,500	435,000
Union.....	9	5	13	7,500	625,000
Miscellaneous.....	5	18	1	700	30,000
Total.....	332	138	344	224,250	\$28,811,000

The miscellaneous churches and missions include one Catholic Apostolic (Irvingite), one Christian Israelite, one Congregational Methodist, one German Swedenborgian, one Greek, one Seventh-day Baptist, and one True Reformed Dutch. There are also four societies

* Including one Freewill Baptist.

which 18 were morning and 10 evening papers; semi-weekly, 7 (1 Italian and 1 Spanish); weekly, 156 (13 German, 2 Spanish, 1 French, and 1 Swedish); tri-monthly, 1 (Spanish); bi-weekly, 2 (1 German); semi-monthly, 20 (2 German and 2 Spanish); monthly, 168 (3 German, 1 Portuguese, and 1 Spanish); bi-monthly, 1; quarterly, 15 (1 German). The whole number printed in foreign languages was 40, viz.: German, 26; Spanish, 7; French, 3; Swedish, 2; and Italian and Portuguese, 1 each. There are 7 special Sunday papers and 7 Sunday editions of daily papers.—Henry Hudson discovered Manhattan island in September, 1609, anchoring in New York harbor on the 11th, and sailing up the Hudson on the 12th. The Dutch, in whose service Hudson sailed, despatched vessels in the following years to this region to trade with the Indians for furs, but the first settlement on the island appears to have been made in 1623. In 1624 Cornelis Jacobsen May was formally installed as the first director or governor, and was succeeded the next year by William Verhulst. In 1626 Peter Minuit arrived as director general, with more ample powers for the organization of a regular government. The same year Fort Amsterdam on the S. point of the island, now the Battery, was commenced. Minuit purchased Manhattan island of the Indians for goods worth \$24. Wouter van Twiller became governor in 1633, and William Kieft in 1638. In 1644 a fence was built nearly on the line of the present Wall street, and in 1653 the city was enclosed along this line from the East to the North river by a ditch and palisades with breastworks. Peter Stuyvesant, the last of the Dutch governors, arrived in 1647, and ruled for 17 years. Charles II., having

come to the English throne, assumed the Dutch occupancy in North America to be a usurpation, and on March 12, 1664, granted the entire territory to his brother the duke of York. A small fleet arrived in August, and the city surrendered without resistance, Col. Richard Nicolls assuming the office of governor. The name (New Amsterdam) was changed to New York, and an English form of government was established, which lasted nine years. In July, 1673, the Dutch recaptured the city, named it New Orange, made Anthony Colve governor, and drove out the English. Their triumph was short, for by the peace between England and the states general the city was restored to the British crown, and once more called New York, and the Dutch power was finally ended, Nov. 10, 1674. For the remainder of the 17th century the progress of the city was rapid. The only untoward event of the period was the unsuccessful rebellion of Jacob Leisler in 1689. (See LEISLER.) The first Trinity church was built in 1696. In 1702 a malignant epidemic prevailed. The "New York Gazette," the fifth newspaper in the colonies, was begun in 1725, and Zenger's "New York Weekly Journal" in 1733. In 1735 occurred the first great libel suit in the city, regarded as an attack upon the freedom of the press. It grew out of the claim of Gov. Cosby to half the salary of his acting predecessor. The people took up the quarrel, the "Gazette" supporting Cosby and the "Journal" violently opposing him. Zenger was imprisoned for libel, and Cosby's party strained every nerve to convict him, but the jury acquitted him. The year 1741 was remarkable for the supposed discovery of a plot on the part of the negroes (slavery having been introduced at an early period) to burn the city and murder the whites, which derived some support from the burning of a part of the public buildings in that year and the breaking out of fires in other places about the same time. Mainly upon the testimony of a single servant girl more than 150 negroes and about 20 whites were imprisoned. About 20 of the negroes were hanged, a smaller number burned at the stake, and more than 75 transported. In 1765 a congress of delegates from nine colonies met in the city, and adopted a bill of rights, in which they asserted that the sole power of taxation resided in the colonies. In the same year the "Sons of Liberty" were organized to oppose the stamp act. In 1770 a meeting of 3,000 citizens was held, who resolved not to submit to oppression, and a slight collision with the troops occurred. In 1773 the vigilance committee agreed to resist the landing of tea, and in 1774 a ship thus laden was sent back to England, and 18 chests found in another vessel were thrown overboard. On April 3, 1775, the colonial assembly finally adjourned; on July 25 delegates were elected to the continental congress; and on Aug. 23 congress ordered Capt. Lamb to remove the cannon from the city forts to the Highlands. Re-

sistance was offered from the Asia man-of-war, but 21 pieces, all that were mounted, were secured. On Sept. 15, 1776, by the result of the battle of Long Island, the city fell into the hands of the British, and so remained until the close of the war. On Sept. 21, 1776, an extensive fire occurred, all the west side of Broadway from Whitehall to Barclay street being laid in ashes. On Aug. 7, 1778, a fire destroyed 300 buildings around Cruger's wharf, on the East river. The winter of 1780 was very cold; ice covered the bay, and heavy teams and artillery crossed to Staten island. On Nov. 25, 1783, the British finally evacuated the city, and Gen. Washington marched in; the day is still annually celebrated under the name of evacuation day. During the war the British had nearly destroyed all the churches except the Episcopal, making prisons, riding schools, and stables of them; the college and schools had been closed. The city was the seat of the colonial government until the revolution. From 1784 to 1797 it was the state capital, though two sessions of the legislature were held at Poughkeepsie and three at Albany during the period. From 1785 to 1790 it was the seat of government of the United States. The adoption of the federal constitution was grandly celebrated in 1788; and the inauguration of President Washington took place at the city hall, April 30, 1789. In 1788 a serious riot occurred at the hospital, in consequence of the careless exposure of dissected bodies. The doctors were mobbed, and their houses invaded; some of them fled from the city, and others took refuge in the jail. In 1791 yellow fever carried off 200 victims. The city, now just reaching the lower corner of the present City Hall park, began to extend along the Boston road (Bowery) and Broadway. In 1795 732, and in 1798 2,086 persons died from yellow fever, which returned at intervals till 1805, but with diminishing virulence. On Sept. 20, 1803, the corner stone of the city hall was laid by Mayor Livingston; the hall was finished in 1812, when the old one in Wall street was sold. In the winter of 1804, 40 stores in Wall, Front, and Water streets were burned. The free school society, the germ of the present board of education, was incorporated in 1805. The streets were now extending across the Canal street marsh, while the collect or swamp where the city prison now stands was being filled up. The spread of population was stimulated by the yellow fever, which drove a third of the people from their dwellings below the park to the woods and fields north of the fresh water. In 1807 Robert Fulton navigated the first steamboat from near New York to Albany. A great fire in Chatham street in 1811 consumed nearly 100 houses. The war of 1812 with Great Britain temporarily checked the city's growth. In 1821 the survey and laying out of the island north of Houston street was completed after 10 years' labor. In the winter of this year the bay was frozen over for the first time in 41 years. Yellow fever

reappeared in 1819, and again in 1822 and 1823, occasioning a great panic; the city south of the park was fenced off and nearly deserted, families, merchants, banks, and even the city government, removing to Greenwich (now the 9th ward) and upper Broadway. This panic materially improved property north of Canal street, and correspondingly expanded the city. Gas first came into general use in 1825. The city now had 12 wards, and was growing at the rate of 1,000 to 1,500 houses a year—a growth occasioned by the completion of the Erie canal, the first boat from which arrived Nov. 4, 1825. The canal celebration was the grandest affair ever known in the country. In the next decade New York received some severe blows from pestilence, fire, and financial disaster. The cholera appeared in 1832, carrying off 3,513 persons, and again in 1834, taking 971. On Dec. 16, 1835, the most disastrous fire known to the city swept the 1st ward east of Broadway and below Wall street, destroying 648 of the most valuable stores, the merchants' exchange and the South Dutch church, and property valued at more than \$18,000,000. With almost miraculous energy the city was rising from these ashes, when the financial explosion of 1837 came, with suspension of specie payments, failures, and bankruptcy throughout the country. Even this, however, but momentarily checked the progress of the city. In 1842 the Croton water was introduced. On July 19, 1845, a great fire occurred between Broadway, Exchange place, Broad, and Stone streets, destroying over \$5,000,000 worth of property. Several lives were lost in the Astor place riot in May, 1849, growing out of the assumed hostility of two prominent actors. (See MACREADY.) Cholera came again in the summer of 1849 and carried off 5,071 persons; again in 1855, when 374 died; and lastly in 1866, when it carried off 1,212. The first city railroad (except the Harlem) was built through 6th avenue in 1852, in anticipation of the projected industrial exhibition, which opened with great ceremony (the president of the United States officiating) July 14, 1853, in a magnificent crystal palace in the form of a Greek cross, built of iron and glass, 365½ ft. in diameter each way, with galleries, and a dome 123 ft. high and 100 wide, the flooring covering 5¾ acres. This building was burned in 1858. In 1857 occurred another financial panic. In the same year the radical change in the control of the police made by the legislature, and the resistance to the act by Mayor Wood, resulted in popular disturbances in June and July. Upon the outbreak of the civil war the citizens of New York responded heartily in behalf of the Union, and during the continuance of the struggle the city furnished 116,382 men (equivalent to 89,183 for three years) to the federal armies, at a net cost of \$14,577,214 65. The only serious disturbance during this period was the riot that broke out on Monday, July 13, 1863, in opposition to the draft. The mob,

composed of the poorer class of the people, held practical possession of the city for several days, and it was not until the 17th that the mayor issued a proclamation declaring the riot suppressed. The offices of the provost marshals where the draft was going on were demolished; stores and dwellings were rifled; many buildings were burned, including the colored orphan asylum, then in 5th avenue; and several negroes, against whom the fury of the mob was particularly directed, were murdered. Collisions took place between the rioters and the troops, who were several times compelled to fire. The number of persons killed during the riot is estimated at more than 1,000, and the city subsequently paid about \$1,500,000 by way of indemnity for losses sustained at the hands of the mob. The draft was resumed in August and completed without resistance. Another riot occurred on July 12, 1871, in which 62 persons were killed, growing out of a procession of Orangemen in commemoration of the battle of the Boyne. Threats having been made by their enemies to break up the procession, the Orangemen were provided with an escort of militia. They were attacked soon after the procession began its march, when the militia fired and dispersed the mob. In the summer of 1871 proofs were furnished that enormous frauds had been perpetrated by the existing officials upon the city treasury, raising the city debt in 2½ years from \$50,000,000 to \$113,000,000, with outstanding claims to an unknown amount still unadjusted (1875). One of the chief instruments of speculation was the court house, large sums appropriated for its construction finding their way into the pockets of the "ring." The amount ostensibly expended in its erection exceeds \$12,000,000. The people were immediately aroused, and assembled in mass meeting in the Cooper institute on Sept. 4, when a committee of 70 members was appointed, to take the necessary measures to ascertain the true state of the treasury, to recover any abstracted moneys, and to secure good government and honest officers. At the ensuing November election the candidates favorable to the accused parties were defeated by large majorities. The latter were subsequently prosecuted and some of them convicted and sentenced, while others fled the country. Several of the judges were impeached, and resigned or were removed from office. The annexation of a portion of Westchester county in 1873 has already been referred to.—The original charter of New York city, known as the Dongan charter, was granted by James II. in 1686. In 1730 the Montgomerie charter was granted by George II., and in 1732 it was confirmed by the general assembly of the province. This charter was of the most liberal nature; it made New York practically a free government, established an elective council, and gave unusual privileges to the people. The most important property grants were the exclusive possession and control of

the waters to low-water mark on all the shores opposite Manhattan island, with the ownership of the ferries for all time, and the proprietorship of all waste and unoccupied lands on the island. The "mayor, aldermen, and commonalty" were made a perpetual corporation. No direct changes were made in this charter for 100 years. In 1829 the people in city convention prepared, and the legislature adopted, the amended charter of 1830. The next amendments were in 1849, when important changes were made. Other changes were made in 1851 and 1853, and in 1857 the charter was materially changed. It was again amended in 1863, and in 1870 the local government was substantially reorganized. The charter of 1870, amended in 1871, was superseded by the present charter in 1873, and this was itself slightly amended in 1874. All these enactments recognize the Dongan and Montgomerie charters as the source of municipal rights, and upon their provisions rest the vast public and private interests of the city.—See "History of the City of New York," by D. T. Valentine (1853); "History of New York City," by Mary L. Booth (2 vols., 1867); "History of New York City," by William L. Stone (1872); and "New York and its Institutions, 1609–1873: the Bright Side of New York," by the Rev. J. F. Richmond (1873).

NEW ZEALAND, a British colony consisting of three islands in the South Pacific ocean, called respectively North island or New Ulster, South island or New Munster, and Stewart island or New Leinster, and some minor adjacent islands, extending between lat. $34^{\circ} 15'$ and $47^{\circ} 30'$ S., and lon. $166^{\circ} 30'$ and $178^{\circ} 45'$ E., about 1,000 m. S. E. of Australia; pop. in 1872, 279,560, exclusive of about 40,000 aborigines. North island is 500 m. long and of very irregular shape, varying in breadth from 5 to 300 m. South island is 530 m. long, with an average breadth of 110 m. Stewart island is triangular, and measures about 36 m. on each side. North island contains 48,000 sq. m., South island 57,000, and Stewart island 1,000; total area, 106,000 sq. m. The three islands, like Italy, resemble a boot, the toe of which is toward the north. North island is separated from South island by Cook's strait, 18 m. wide in its narrowest part; and South from Stewart island by Foveaux strait, 15 m. wide. The coast line of the whole group is about 3,000 m. in length, of which about one half belongs to North island. The best harbors of this island are in the north, between North cape and Cape Colville, including Auckland and other excellent ports. South of Cape Colville, on the E. side, for the space of 200 m., there are only two safe anchorages, Mercury bay and Tauranga, the former of which does not admit large vessels. On the remainder of the E. coast, for a distance of 400 m., there is no safe harbor except Wellington at the S. end of the island. On the W. coast of North island the principal harbors are Manukua, Kai-

para, and Hokianga, which are spacious and secure, but obstructed by sand bars at the entrances. At the N. extremity of South island are many extensive sounds and harbors with deep water; but along the whole of the E. coast, for 500 m., the only harbors are Akaroa, Victoria, and Otago. On the S. and S. W. sides of this island ports are numerous and excellent; and higher up on the W. side is Jackson's bay, a safe anchorage. From Jackson's bay northward, 300 m., the rest of the W. coast of South island is open and exposed. In Stewart island there are several safe harbors. The tide on the E. coast of the group rises to the average height of 8 ft., and on the W. coast 10 ft.—The centre of North island is occupied by lofty mountains, which send off spurs in various directions to the seacoast, and are covered from their bases nearly to their summits with primeval forests. The highest mountain of the central range is Ruapehu, 9,195 ft. high, rising into the region of perpetual snow; one of its peaks, Tongariro, is an active volcano, 6,500 ft. high. W. of it, near the coast, is Mt. Egmont, a volcano, 8,270 ft. high; it is a perfect cone, and always capped with snow. Three lines of volcanic craters with high cones stretch across the island, and in the centre of the great bay of Plenty off the N. E. coast is an active volcano called Wakari or White island, 3 m. in circumference and 860 ft. high. South island is traversed by a mountain range running from the N. to the S. W. extremity; in some places it reaches an elevation of 13,000 ft.; the loftiest peak is known as Mt. Cook (13,200 ft.), and the highest portion of the range as the Southern Alps. Toward both the E. and W. coasts this range is abrupt and precipitous. On the east broad and fertile plains, and on the west a narrow strip of land, lie between it and the sea. In the centre of the island are extensive table lands. There are no active volcanoes in South island. Stewart island is mountainous, but the highest summits barely exceed 3,000 ft.—North island abounds in rivers and inlets of the sea, which give easy access to the most inland districts. The largest river, the Waikato, rises in the Taupo lake, near the centre, and running N. 200 m. reaches the sea on the W. coast. Several rivers of considerable size flow from the central mountains of South island across the great eastern plain to the sea. These are subject to great and sudden floods from the melting of the mountain snows. The interior of North island abounds in lakes, one of which, Lake Taupo, is 30 m. long and 20 broad; another, Rotomahana, is in parts boiling hot. There are several extensive lakes in the centre of South island, one of which, Te Wai Pounamu, is said to be of a green color and bordered by greenstone rocks.—In North island the rocks are primary, metamorphic, volcanic, trappean, and sedimentary. The mountains are chiefly composed of lower slate rocks, intersected with basaltic veins, scoriae, slate,

primary sandstone, and limestone. The rocks contain sulphur, alum, manganese, obsidian, iron, copper, silver, gold, and other minerals. In the limestone districts are extensive caverns. Hot and cold springs, impregnated with sulphur, iron, and silicious matter, abound. In South island the lower rocks are clay and metamorphic schists, intersected by dikes of greenstone, with compact and amygdaloidal basalt. The plains are composed of clayey loam, and beds of coal and lignite are known to exist. Gold, iron, and coal abound, and copper, lead, tin, and petroleum are found. Iron sand, or steel, as the natives call it, is found near New Plymouth on the W. coast of South island, soft to the touch, but almost as heavy as iron, from which it is said 75 per cent. of pure metal has been extracted. Earthquakes are very frequent in New Zealand. Cook's strait is the centre of the earthquake region. The shocks are not violent. Throughout the group there appears to be a gradual rising of the land, so that in Cook's strait rocks have appeared where none were visible when the country was first discovered, and at Port Nicholson the land has risen several feet since 1848. "New Zealand," says Dr. Thomson, "is an admirable geological school; there travellers may see the form of Vesuvius, the dome-shaped summits of Auvergne, the elevated craters of the Carácas, and the geysers of Iceland. Taupo, Tongariro, Rotomahana, Rotorua, and White island are almost unrivalled geological curiosities. Above the entombed village of Te Rapa, on the border of the Taupo lake, basaltic rocks may be seen in the process of conversion into soft clay by heat and chemical action; where the Tongariro river falls into the lake, travellers may observe how rapidly pumice stone and other deposits are lessening the size of this inland sea. Grand and beautiful geysers ejecting water 2° above the boiling point, and holding various silicates in solution, are found around the lakes of Rotomahana and Rotorua. This water on cooling incrusts every substance it comes in contact with, and birds thrown into it are brought out like pieces of flint." (See GEYSER.)—The flora of New Zealand is as remarkable as its geology. It is characterized by the comparatively large number of trees and ferns, the paucity of herbaceous plants, and the almost total want of annuals. There are 120 species of indigenous trees, and more than 3,000 species of plants, of which over 500 species of flowering plants are peculiar to the country. The *coniferæ* are the most conspicuous natural order, although with comparatively few species. Almost all the trees are evergreens, and the change of seasons consequently makes little difference in the appearance of the forests. The most remarkable tree is the *kauri* pine, which is found only in the N. part of North island. It grows to great size, often to a circumference of 40 ft., rising to the height of 90 ft. without a branch. From the lightness and toughness of the stem it is well adapt-

ed for masts. It produces abundantly a gum which becomes very valuable after lying long buried in the earth; it is dug up on the site of ancient forests, and is a considerable article of commerce. The *totara* pine equals the *kauri* in size and commercial value; and the *puriri*, of the same botanical order as the teak, rivals the English oak in hardness, and has a girth of 20 ft. One palm tree, the *areca sapida*, grows in New Zealand. The abundant fern roots of the country formerly supplied the aborigines with food, as did also the tender shoots of the palm. From the poisonous *tutu* berries they expressed a wholesome and refreshing drink. The trunks of the *kauri* and *totara* pines served for canoes, and the tough *tī* tree furnished paddles and spears. But the main reliance of the natives was on flax, which was used for building and thatching huts, and of which they made sails, nets, fishing tackle, plates, ropes, baskets, medicine, and the chief part of their clothing.—Thirteen species of sea mammalia are found on the coasts, viz., eight whales, two dolphins, and three seals. Dogs and rats were the only native quadrupeds when the islands were first visited by Europeans. The native rats have been nearly destroyed by the Norway rat, introduced by the English settlers; and the native dogs are now extinct, no care having been taken to preserve them after the introduction of swine, which took their place as food for the natives. New Zealand has 133 species of birds, most of which have plumage of dull colors. Of the falcon family there are two species: the *kaku*, about the size of a pigeon, and the *karewarewa*, an active sparrow hawk. The only species of owl is called by the natives *ku-ku* or *ru-ru*, and by the settlers "more pork," because its cry resembles these words. The *huia*, about the size of a blackbird, has four long tail feathers tipped with white, which are worn by the natives as ornaments for the head. The *tui*, a dark-colored bird of the honeysucker family, is called the parson by the Europeans from two snow-white feathers which hang under the chin like a clergyman's bands; it is also called the mocking bird from its powers of imitation. It is one of the most common birds in the country. Another honeysucker, called *kokoromaka* by the natives and bell bird by the settlers, is about the size of a sparrow, with a long beak, and is a famous songster. There is one species of crow, a small, timid, and thievish bird. The parrot family is abundant, and has five species, three of which are small green birds with different colored heads. The *kaka* is a large brown parrot, great numbers of which assemble at sunrise and sunset on berry-bearing trees, uttering discordant screams, which among the natives serve as signals for the beginning and end of the day's labor. The *ka-kapo*, or night parrot, is a very remarkable species, about the size of a common fowl. There is one species of pigeon, a large, stupid bird, very numerous and much used for food. The

most peculiar birds of New Zealand are three species of the kiwi or apteryx, allied to the gigantic extinct dinornis, whose bones are also found here. (See *APTERYX*, and *DINORNIS*.) There are no serpents in New Zealand, and toads and frogs were unknown till 1852, when a few small specimens were found. Six species of small and harmless lizards have been found, and are held in terror by the natives, who think the spirits of their ancestors inhabit them. There are more than 100 species of fish on the coasts, the largest peculiar to the islands being the *hapuku*, often exceeding 100 lbs. in weight. In the rivers and lakes eels are found weighing 50 lbs., and the lakes abound with *inanga*, a small, delicate fish, resembling the English whitebait. Of the 100 species of insects one half belong to the order *coleoptera*. Mosquitoes and sand flies are plentiful and troublesome in North island in summer. Spiders are numerous, and two species are said to be poisonous.—The climate of New Zealand is one of the finest in the world. The summer is longer and somewhat warmer than that of England, and the other seasons much milder, with many more fine days. High winds prevail in some districts; in others the atmosphere is peculiarly serene. The coast climate is the most changeable and the most temperate in the world, the heat varying from 40° to 70°, and occasionally reaching both extremes in 24 hours. The mean annual temperature of North island is 57°, and that of South island 52°. January and February are the warmest months, June and July the coldest. Snow rarely lies on the ground at the level of the sea, and ice is seldom seen. There are neither wet nor dry seasons. A fortnight seldom passes without rain, and rain rarely continues for three successive days. The atmosphere is moist, and fogs are frequent in the southern part of the group. There is not only sufficient sunshine, however, to ripen every English fruit, but figs, peaches, grapes, nectarines, melons, and maize thrive well in the open air. Spring begins in September, summer in December, autumn in April, and winter in June. The summer mornings are always cool and exhilarating, and the summer nights often singularly beautiful and mild.—New Zealand is divided into eight provinces, of which Auckland, Taranaki, Wellington, and Hawke Bay are on North island, and Nelson, Marlborough, Canterbury, Otago, and Westland on South island. Stewart island is included in the province of Otago. Auckland, the chief town of the most northern province, was the capital of all New Zealand till 1865, when the seat of government was transferred to Wellington. The Bay of Islands, a small settlement on a fine harbor, 120 m. N. of Auckland, is much resorted to by American whalers, and is the seat of an American consulate. The capital of Taranaki is New Plymouth, beautifully situated near Mt. Egmont, on the W. coast. Wellington, the present capital of the colony (pop. about 8,000), is

on a beautiful bay opening into Cook's strait. Napier, a small village on the S. E. coast, is the seat of government for the province of Hawke Bay. Nelson, the capital of the province of the same name, is on Blind bay at the N. end of South island. It enjoys a more equable, serene, and dry climate than any other part of New Zealand, and has a population of 6,000 in its immediate vicinity. Blenheim, near the mouth of Wairau river in Cook's strait, is the capital of Marlborough. The capital of Canterbury is Christchurch, on the small river Avon, on the E. side of the island. Dunedin, on the S. E. coast, is the capital of Otago, the most southern province. Hokitika, capital of the province of Westland, is at the mouth of Hokitika river; pop. about 5,000. It was hastily built in 1864, when gold mining began on the W. coast. The harbor is obstructed by dangerous bars. The colonists of New Zealand have been superior to those of most English colonies. The imperial parliament in 1852 sanctioned a constitution for the colony, of which the main provisions are as follows: The provinces have distinct governments, consisting of a superintendent and provincial council elected for four years by a suffrage nearly universal. The government of the whole colony is vested in a governor appointed by the crown, who is also commander-in-chief of all the colonial troops, and in a general assembly consisting of a legislative council and a house of representatives, the latter having 78 members elected for five years, and the former 45 members nominated for life by the crown. Both in the general and provincial administrations the principle of responsible government is carried out, and legislative majorities, as in England, make and unmake cabinets. The colonial cabinet consists of the secretary, treasurer, postmaster general, and ministers for general defence and for native affairs. The revenue in 1872 was £3,517,072; expenditures, £3,550,854; public debt, £7,360,616. In 1873 there were about 3,000 m. of telegraph in operation, and several railways were projected, small portions of two or three constructed, and nearly 4,000 m. under contract. In the same year 775 vessels arrived, and 773 departed. The intercourse with the United States has been chiefly confined to the visits of a few whalers, mostly at the Bay of Islands. The course of travel from Great Britain to the colony has generally been round the cape of Good Hope, but a more expeditious journey can now be made by way of the United States, from San Francisco to Auckland, in American steamers which carry the mail by contract with the New Zealand government. The colonists are mostly employed in agriculture, and many give their attention to sheep raising, farms of thousands of acres being devoted to that use. The number of sheep in 1872 was 9,700,629, and the value of wool exported, £2,064,480. In North island, and to some extent in South

island, English grasses have been introduced, by which about five sheep to the acre may be kept, while the native grasses will not sustain more than half that number. The exports consist of potatoes and other provisions and timber to Australia, and of gold, wool, tallow, spars, flax, gums, and copper ore to England. Gold was first discovered in 1842, and subsequently in larger quantities in 1851, 1852, and 1856, especially in Auckland, Westland, and Nelson provinces; and the mines have proved to be among the richest in the world. The yield in 1872 was 445,370 oz., and from April, 1857, to December, 1872, the total export was 6,718,248 oz., valued at £26,084,260; capital employed in mining in 1872, £12,000,000; number of miners, 27,376, of whom 3,700 were Chinese. The total exports in 1872, gold included, were £5,190,655; imports, £5,142,951.—Education has been liberally provided for, chiefly by the church organizations, and there are good schools in all the towns. In some provinces state aid is given to both national and denominational schools, in others only to the national. A university has been established at Dunedin, and high schools exist in many of the towns. In 1872 there were in all 397 schools, 602 teachers, and 22,180 pupils. Among the religious denominations, the church of England has always taken the lead, having sent out the first missionary to the natives, the Rev. Samuel Marsden, in 1814; the first bishop, the Rev. G. A. Selwyn, was appointed in 1841. There are now six bishops of that church in the islands. The support of the churches comes from home grants, lands set apart for church purposes, and voluntary contributions. The Wesleyans commenced missions in 1819, and now have 77 chapels and a larger number of adherents among the natives than any other denomination. The province of Otago was settled by Scotch Presbyterians, and they are numerous in that part of the islands. The Roman Catholics have bishops at Auckland, Dunedin, and Wellington, with a large number of adherents among the colonists and some also among the natives.—The Maoris, the primitive inhabitants of New Zealand, are a tribe of the Polynesian branch of the Malayo-Polynesian family. The average height of the men is 5 ft. 6½ in., average weight 140 lbs. Their bodies and arms are longer and their legs shorter than those of Englishmen of the same stature. The New Zealander's hair is generally coarse and black, though sometimes rusty red. He has good teeth, a broad nose, dark brown eyes, large mouth, and an olive brown skin, which in some is so fair that blushes can be seen, while in a few the skin is dark almost to blackness. The women are not handsome, though when young they are graceful and pleasing, with mild eyes, pathetic voices, and great ease of manner. In tattooing the New Zealanders have outstripped all other people. Tattooing on the face they term *moko*, and on the body *whakairo*, the term tattoo,

though of Polynesian origin, being unknown in their dialect. The male New Zealanders tattoo their faces, hips, and thighs; the women their upper lips. The figures are alike among persons of the same tribe. The pigment used is charcoal made from kauri gum and other vegetable substances. Under the skin the charcoal looks blue, and grows less dark in the course of years. Since the introduction of Christianity tattooing is going out of fashion. The heads of the New Zealanders are on an average smaller than those of Europeans. They are deficient in reason and judgment, have little imagination, and are seldom capable of generalizing; but they possess good memories and quick perceptions. Their fables, traditions, and songs show wit and humor, which they also often display in conversation. They are fond of simple and noisy music, and have an accurate perception of time. They comprehend pictures with difficulty, and do not understand the blending of colors. They are vain, proud, arrogant, and revengeful; hospitable to strangers, but not generally benevolent; affectionate to their friends and kindred, honest and observant of their promises. They are dirty and indolent, but less addicted to intoxication than most savages. When found by the Europeans they were divided into 18 nations, which were subdivided into tribes. Each tribe acknowledged a chief, who in his turn regarded the chief of the nation as his lord. Each nation was divided into six classes: the *ariki*, or principal chief, who was also high priest; the *tana*, or family of the principal chief; the *rangatira*, or inferior chiefs; the *tutua*, or middle classes; the *ware*, or lower classes; and the *taurakareka*, or slaves. The succession of chiefs was hereditary, and they had both civil and ecclesiastical jurisdiction, but could do little without the sanction of the majority of the people. The institution of the *tapu* or taboo, by which certain things or persons were made sacred for longer or shorter periods, was of much political value, and was freely used in governing and restraining the common people. The New Zealanders worshipped various gods, apparently personifications of natural objects and powers, to whom they addressed prayers and offered sacrifices. Their gods were spiritual and invisible; they had no idols. Many of the gods were deified men, ancestral chiefs of the tribe or nation by whom they were worshipped. They believed in a future state and their own immortality. There were two distinct abodes for departed spirits, neither of which was a place of punishment, evil deeds being punished in this world by sickness and other personal misfortunes. Their priests were supposed to be in communication with the gods, and to express their wishes and commands. Sorcerers were thought to possess great powers, and were held in peculiar dread. The moral code was adapted to various social conditions and circumstances. Among chiefs, courage, liberality, command of

temper, endurance of torture without complaint, revenge of injuries, and abstinence from insult to others, were regarded as virtues; among slaves, obedience to their masters and respect for the taboo; among married women, fidelity to their husbands. A ceremony called *iriiri* or *rohi* was performed by the priests upon infants before they were a month old, and consisted of a species of baptism, sometimes by sprinkling, sometimes by immersion. After baptism the priest forced little pebbles down the throat of the child to make his heart hard and revengeful. When first visited by Europeans, the New Zealanders lived in fortified villages (*pahs*), built on peninsulas or on hilltops. Since the general introduction of Christianity, these forts have been abandoned, except a few that are conveniently situated, and the natives live in open villages and farm houses. The different nations were almost constantly at war, and deadly feuds were frequent between tribes. These contests were carried on with great ferocity, the defeated tribe being reduced to slavery, or killed and eaten; cannibalism was universal. Quarrels about land and women were the usual causes of strife, but wars were not entered upon without much deliberation and attempts at conciliation. Sea fights occasionally took place between fleets of canoes, these vessels for military purposes being made 80 ft. long, 4 ft. wide, and 4 ft. deep, propelled by 50 paddles. The weapons used in war before the introduction of firearms were slings, javelins, long spears made of pine hardened by fire and sharp at both ends, and clubs and tomahawks of greenstone or other hard stones. Bows and arrows were known, but not used in war. Of late years these arms have all been laid aside, and firearms adopted. Wars among the aborigines have nearly ceased since slavery and cannibalism have been removed by Christianity and civilization. Marriage among the New Zealanders did not involve any religious ceremonies. Before marriage girls not betrothed were permitted to indulge in promiscuous intercourse if they pleased, and the more lovers they had the more highly they were esteemed. Married women, however, were kept under strict restraint, and infidelity was punished severely, often with death. Polygamy was permitted, but not common, and men could divorce their wives simply by turning them out of doors. Since the introduction of Christianity a great change has taken place. The natives are now generally clothed like civilized men, and possess flocks, herds, furniture, houses, and cultivated lands. One half of the adults can read and write, and two thirds of them belong to Christian churches. But from various causes, especially from the introduction of new diseases, their numbers are rapidly diminishing. In 1872 the number of the aborigines, formerly computed at 100,000, was less than 40,000, nearly all in the North island.—The Maori is one of the Polynesian languages.

(See MALAYO-POLYNESIAN RACES AND LANGUAGES.) Consonantal sounds employed in it are *k, ŋ, h, ʔ, t, n, s, l, r, p, m, f*, and *w*; the sound of *v*, heard in the other languages of the Polynesian group, is wanting, and replaced by the English *w*. It possesses the vowels *a, e, i, o, u*, both long and short. The words are formed from dissyllabic stems, either by reduplication or by prefixes and suffixes. Reduplication in verbs signifies either repetition, as *haere*, to walk, *haerehaere*, to walk to and fro; or intensity, as *kai*, to eat, *kakai*, to eat rapaciously; or simultaneousness, as *moe*, to sleep, *momoe*, to sleep with somebody. Reduplication in adjectives signifies either the superlative degree or the plural number, as *ika pai*, a good fish, *ika papai*, good fishes. Reduplication in nouns signifies the plural of collectives. The prefixes and suffixes are loose particles, without exercising any phonetic influence on the words which they accompany. The want of grammatical number and the processes of indicating it in the Polynesian languages has been spoken of in the article referred to above. In Maori the force and use of the particles would render the declension of a noun, after the model of the inflected languages, as follows: Singular—nom. *te tāhata*, the man; gen. *o* or *a te tāhata*; dat. *ki te tāhata*; acc., loc., and instr. *i te tāhata*; abl. *e te tāhata*; plural—nom. *ā tāhata*; gen. *o* or *a na tāhata*; dat. *ki ā tāhata*; acc., loc., and instr. *i ā tāhata*; abl. *e ā tāhata*. There are exclusive and inclusive dual and plural expressions. The personal pronouns *ahau*, I, *koe*, thou, *ia*, he, have the dual *tava*, *korua*, *raua*, and the plural *taton*, *kouton*, and *raton*. When the speaker does not include himself, he says *maua* in the dual and *maton* in the plural number. Verbs may be arranged in paradigms somewhat as follows: *karaña*, to call; active—present (1st person sing.), *e karaña ana ahau*; preterite, *i karaña ahau*; pluperfect, *kua karaña ahau*; future, *e karaña ahau*; future present, *ka karaña ahau*; passive—present, *e karañatia ana ahau*; preterite, *i karañatia ahau*; pluperfect, *kua karañatia ahau*; future, *e karañatia ahau*; and future present, *ka karañatia ahau*. The particles *e, i, ka*, and *kua* indicate the time; the suffix *tia* the passive voice. Negation is expressed by the particle *te*. The first ten cardinal numbers are *tahi*, *rua*, *toru*, *wa*, *rima*, *ono*, *witu*, *walu*, *iva*, and *nahuru*. A considerable body of literature was preserved by tradition in the shape of fables, stories, proverbs, songs, and laments for the dead. Their poetry is mostly lyrical, none epic or dramatic. Each sentence is metrically arranged, but rhyme is not used. The prose stories are of great length, some of them requiring successive days for their narration. In style and spirit they resemble children's tales. Several collections of this literature have been made, as "Poems, Traditions, and Chants of the Maoris," by Sir George Grey (Wellington, 1855), and

Monrad, in *Das alte Neu-Seeland* (Bremen, 1871).—The Maoris, according to their own traditions, came originally from a place called Hawaiki, which the most recent investigators suppose to have been Savaii in the Samoan islands. Their traditions still speak of Rarotonga and other islands of that region. In consequence of civil war their ancestors to the number of 800 emigrated from Hawaiki in 20 large canoes about A. D. 1400, and after a voyage of 3,000 m. reached New Zealand, which they found uninhabited. The discovery of New Zealand by Europeans is claimed by the French, Spaniards, and Dutch. It is asserted that Binot Paulmier de Gonneville, a French navigator, visited the country in 1504, and that Juan Fernandez reached it from the W. coast of South America in 1576; but these accounts are doubtful. The Dutch navigator Tasman, with two ships from Batavia, anchored on Sept. 18, 1642, in a bay in South island, next to that in which the town of Nelson now stands. He had an encounter with the natives, in which he lost four men, and departed without landing, calling the place Massacre bay, and naming the country New Zealand. Capt. Cook landed at Tauranga in the province of Auckland in 1769, and took possession of the country for the crown of England. Three years later a French navigator, Marion du Fresne, arrived with two ships in the bay of Islands, and after a month's friendly intercourse with the natives offended them by violating the taboo and putting some of their chiefs in irons, and was attacked and killed with 25 of his men. Capt. Cook subsequently visited New Zealand four times, and introduced pigs, potatoes, and other animals and vegetables. A few years later English and American whalers began to frequent the coast, and several runaway sailors took up their abode among the people and married native women. European visitors were generally treated with kindness, though in 1809, the captain of the English ship Boyd having flogged and otherwise ill-treated a chief at Wangaroa, his tribe massacred the crew and passengers to the number of 70. In 1820 Honga Hika, the most distinguished of New Zealand chiefs, visited England, where he was received with attention by George IV. and loaded with presents, with which he returned to his own country, favorable to the introduction of civilization and Christianity; for though he did not become a Christian himself, he intrusted his children to be educated by the missionaries, whom he always protected and encouraged. In 1833 the British government appointed a resident at New Zealand, and in 1838 Capt. Hobson was sent to the islands as lieutenant governor, the European population at that time exceeding 1,000 persons, and the number of vessels, chiefly whalers, entering the bay of Islands in that year amounting to 130. The number of converts made by the missionaries was at this time about 4,000. In 1839 the New Zealand company was chartered in England

with a capital of £500,000, the earl of Durham, Francis Baring, and other eminent merchants and statesmen being at its head; and systematic colonization was commenced by a settlement at Port Nicholson on Cook's strait. In 1844 a serious war broke out with the natives, in which the town of Kororareka, an English settlement, was destroyed, and the English troops were repeatedly defeated. Peace was restored in 1848, and shortly afterward a severe earthquake shook a large portion of New Zealand, doing much damage and causing great alarm. In 1850 Canterbury province was settled on church of England and aristocratic principles, a bishop, priests, lords, baronets, and gentlemen of all the professions being among the early settlers. Two years before the province of Otago had been settled exclusively by members of the Free church of Scotland. These colonies are now composed of persons of every variety of Christian faith. In 1855 a second war with the natives broke out in Taranaki province, about land claims, which ended in 1857. It is generally conceded, even by English writers, that the lands of the natives were sometimes taken without just compensation, and that wars were needlessly provoked, in which the British often fared the worst, the savages fighting with fearful energy and desperation behind their slight intrenchments. One of the most desperate encounters was in 1863, when 15,000 soldiers under English command contended against 2,000 natives, hiding and fighting behind ramparts. Another struggle followed in 1864, and petty rebellions have been frequent, causing great expense and trouble to the colonists and great demoralization among the converted natives. As they learned to hate the colonists, they hated their religion, and invented one of their own, called How-Howism, those who professed it being called How-Hows. It was a most absurd mixture of their old superstitions with some Bible tenets, and a virtual return to heathenism. One Te Kooti made himself famous, fighting with a handful of followers against the English from 1866 to 1872, when the pursuit of him was virtually abandoned. Since that time the natives have been more quiet, and the colonists seem more disposed to try the effect of kind treatment and conciliation. By the constitution of 1872 the natives were made voters and eligible to office. Four of them have recently been elected members of the lower house of the legislature.—See "The Story of New Zealand," by A. S. Thomson (London, 1859); "The War in New Zealand," by W. L. Fox (1866); "The Past and Present of New Zealand," by the Rev. R. Taylor (1868); *New Zealand*, by Hochstetter (Stuttgart, 1863; English translation, London, 1868); "Australia and New Zealand," by Anthony Trollope (London, 1873).

NEY. I. Michel, duke of Elchingen and prince of the Moskva, a French soldier, born at Saarlouis, Jan. 10, 1769, executed in Paris, Dec. 7,

1815. He enlisted in the army at the age of 18, and when the revolution of 1789 broke out he was a sub-lieutenant of hussars. In 1794 he was a captain in the army of the Sambre and Meuse. Kléber caused him to be promoted, and intrusted him with several expeditions which proved highly successful. He was made a brigadier general, and on April 18, 1797, by a brilliant charge he contributed to the victory of Neuwied. A few days later he was captured in a skirmish, but was soon exchanged. In 1799, at the head of 150 men, he surprised Mannheim, for which he was made general of division. He accompanied Masséna to the valley of the Danube, and during the battle of Zürich kept the archduke Charles at bay. He approved of the *coup d'état* of the 18th Brumaire. Under Moreau he was in most of the engagements of the spring campaign of 1800, and participated in the victory of Hohenlinden. During the peace which followed he married, by Bonaparte's advice, Mlle. Auguié, a friend of Hortense Beauharnais. He was appointed inspector general of cavalry and minister plenipotentiary to Switzerland, and in 1803 was placed in command of the sixth corps at the camp of Boulogne. On the proclamation of the empire, Ney received the title of marshal. In 1805 he led one of the corps of the great army which, under command of the emperor, crossed the Rhine. His generalship and bravery at Elchingen won him his title of duke. He forced Mack into Ulm, entered Tyrol, routed the archduke John, took possession of that province, and seconded the operations which resulted in the victory of Austerlitz. In the Prussian campaign of 1806-'7 he assisted in the victory of Jena, forced Magdeburg to capitulate, rescued Bernadotte at Mohrungen, defeated the Prussians under Lestocq, held his ground at Eylau, and determined the triumph of the French at Friedland, where he commanded the right wing, which stormed the town. He was sent to the peninsula in 1808, took possession of Asturias and Galicia, attacked Portugal with some success, and when Masséna was compelled to fall back protected his retreat. But Napoleon suspected his fidelity, and recalled him. In 1812 he accompanied the emperor in the invasion of Russia. He defeated the Russians at Krasnoi, assisted in the capture of Smolensk, and bore himself so bravely at Borodino that Napoleon gave him the title of prince of the Moskva. During the retreat from Moscow he was separated from the army for several days, but reappeared with his corps greatly reduced, having defeated all the Russian troops that opposed him. When Napoleon and Murat had left the army, Ney saved all that could be saved from the wreck. He subsequently worked night and day to reorganize the army, and he was conspicuous at Lützen, Bautzen, Dresden, and Leipsic; and when the French army evacuated Germany, he commanded the rear guard. When France was invaded in 1814, he fought the battles of

Brienne, Montmirail, Craonne, and Châlons-sur-Marne. On Napoleon's abdication, April 11, 1814, Ney flew to Louis XVIII., who made him a peer of France, chief of nearly the whole French cavalry, and commander of the sixth military district. When Napoleon landed at Cannes, Ney promised Louis under oath that he would bring him "a prisoner in an iron cage." But when he heard of the enthusiastic reception of Napoleon at Lyons, when he saw his old companions flocking around the emperor, when his own troops called upon him to lead them to their chief, he yielded to the impulse of the moment, proclaimed Napoleon the only legitimate sovereign of France, joined him at Auxerre, and with him entered Paris, March 20, 1815. He led the right wing in the march to Belgium, fought all day at Quatre-Bras, and in the battle of Waterloo displayed the utmost energy and bravery in the attack upon La Haie-Sainte, having five horses killed under him. In the chamber of peers, June 22, he declared that all was lost and the country could only be saved by negotiation. He was not employed by the provisional government; and the king on his return issued against him and several others, on July 24, a decree of proscription. Ney escaped to Auvergne, but was arrested in August, brought to Paris, and arraigned before a court martial, consisting of Marshals Mincey, Augereau, Masséna, and Jourdan. These old brothers in arms availed themselves of a legal technicality to declare their incompetency to judge him, and the case was transferred to the court of peers. Here the majority consisted of his political or personal enemies, so that, notwithstanding the able defence of his counsel, Dupin and Berryer, he was sentenced to death on Dec. 6. On the following morning, after taking farewell of his wife and sons, he was marched to the end of the Luxembourg garden; there, placing himself in front of the troops who were to shoot him, and pressing his right hand to his heart, he cried: "*Vive la France!* Fellow soldiers, fire here!" He was killed instantly. He was buried in Père Lachaise. His *Mémoires* (2 vols. 8vo, 1833) were published by his widow and sons, and Dumoulin has given a full account of his trial (*Histoire complète du procès du maréchal Ney*, 2 vols., 1815). Fruitless attempts were made to have the sentence reversed by the chamber of peers; but it was cancelled by public opinion, and a bronze statue was erected to him in 1854 on the spot where he was executed. Ney left four sons, Joseph Napoléon, Michel, Eugène, and Edgar. **II. Joseph Napoléon**, prince of the Moskva, born in Paris, May 8, 1803, died at St. Germain-en-Laye, July 26, 1857. He married in 1828 the daughter of Jacques Laffitte, the banker, was appointed aide-de-camp to the duke of Orleans after the revolution of 1830, and was made a peer in 1831, but did not take his seat in the chamber till 1841. In 1848 he sided with the democratic party. He was elected to the legislative assembly by the de-

partments of Moselle and Eure-et-Loir in 1849, and attached himself to the party of the prince-president. He was one of the first senators created under the empire. After being colonel of lancers and dragoons, he was appointed brigadier general in 1853; but he was better known as a patron of arts, literature, and the turf, than as a soldier. He composed an opera called *Régine*. His only daughter was married to Count Persigny.

NEZ PERCÉ, a N. county of Idaho, bounded N. by the Clearwater river, E. by Montana, S. by Salmon river, and W. by Oregon and Washington territory, from which it is separated by the Snake river; area, 7,350 sq. m.; pop. in 1870, 1,607, of whom 747 were Chinese. It is watered by tributaries of the Clearwater and Salmon rivers. The surface is generally rugged and mountainous. The valley of the Clearwater contains extensive arable lands, and Camas prairie in the N. W. corner is very fertile. Gold is mined to some extent. The chief productions in 1870 were 1,970 bushels of wheat, 6,050 of oats, 3,595 of barley, 3,780 of potatoes, and 18,900 lbs. of butter. There were 534 horses, 916 milch cows, 1,076 other cattle, and 542 swine. Capital, Lewiston.

NEZ PERCÉS, a tribe of American Indians, now in Idaho, belonging to the Sahaptin family. They are said to call themselves Numepo, and are styled by Lewis and Clarke Chopunnish. The origin of their present name is uncertain, for they are not known to have pierced their noses. The Wallawallas and Paloooses are kindred tribes. They were estimated at 8,000 on the Clearwater and Lewis rivers, where they had a fine grazing country. They made a treaty of peace with Lewis and Clarke, which they have adhered to. Capt. Bonneville in 1832 acquired influence among them, and a mission under the American board was established in 1836, when the tribe numbered about 4,000. A school was opened, laws were adopted, a government was formed, and attempts were made to advance agriculture. But the mission was suspended in 1847, after the murder of the Rev. Mr. Whitman by the Cayuses. They had only 50 acres under cultivation in 1857. In the Oregon Indian war the mass of the tribe remained friendly, saving the lives of Gov. Stevens and others in 1855, and covering Col. Steptoe's retreat. When Col. Wright asked the head chief what they wanted, he replied: "Peace, ploughs, and schools." A treaty was made in 1854 disposing of part of their land, but a portion of the tribe never submitted to it, and the treaty Nez Percés alone went on the reservation. The others are often absent for years on the buffalo plains, occasionally at war with the Sioux. Those on the reservation were soon disturbed by white and Chinese miners after gold was discovered in 1859. This led to the introduction of liquor, and drunkenness now prevails. The Lapwai reservation is in the N. W. part of Idaho, and is said to contain the best land in

that section. The Kamiah reservation is in N. E. Oregon. The two contain 1,925 sq. m. In 1874 there were 1,550 on the reservations, and 350 on small farms off the reservations. The Presbyterians had revived the mission, a stone church had been erected, about 1,800 acres were cultivated, and their property in horses and cattle was estimated at \$136,250. There were also 900 Nez Percés in Wallowa valley in the eastern part of Oregon. The New Testament and some school books have been printed in their language.

NGAMI, a lake of South Africa, supposed to be from 50 to 70 m. long, and from 7 to 9 m. wide. Its situation may be roughly stated as in lat. 20° 28' S., lon. 22° 50' E., and it extends from E. N. E. to W. S. W., being narrowest at a point near the middle. Its elevation above the sea is 3,285 ft. as determined by Livingstone, but a subsequent measurement by Andersson makes it 3,713 ft. The water is perfectly fresh except when the lake is low; it then becomes brackish. It is subject to a rise and fall of two or three feet, the cause of which is unknown. A low and sandy shore forms the northern border of the lake, and extends about a mile backward, beyond which the country is well wooded. The opposite shore is elevated, fringed with belts of reeds and bushes, and only accessible in a few places. The principal tributary of Lake Ngami is the Tioje, a river which flows in on the west and is about 40 yards broad, but very deep when at its highest stage. It overflows in June, July, and August, and sometimes later. The Zougga, a broad and sluggish river, issues from the E. extremity of the lake; its width at the outlet is 200 yards. After an easterly course of about 200 m. the waters of this stream expand into a small lake known as Kumadau, beyond which they do not suffice to fill the channel, and disappear, probably by evaporation. It is supposed, however, that the Zougga communicates with the Limpopo, and also that the tributaries of Lake Ngami are connected with the Zambesi river system. This lake was discovered in 1849 by Livingstone, Oswell, and Murray, and has since been visited by Andersson and other Europeans.

NIAGARA, a river of the United States and Canada, flowing N. 33 m. from Lake Erie to Lake Ontario, between the state of New York and the province of Ontario, and having in its course the most celebrated falls in the world. It is the channel by which all the waters of the four great upper lakes flow toward the gulf of St. Lawrence, and has a total descent of 333 ft., leaving Lake Ontario still 231 ft. above the sea. The interruption to navigation occasioned by the rapid descent of the Niagara river is overcome on the Canadian side by the Welland canal; and on the American side the communication between tide water and the upper lakes was first effected by the Erie canal. From the N. E. extremity of Lake Erie the Niagara river flows in a northerly direction

with a swift current for the first 2 m., and then more gently with a widening current, which divides as a portion passes on each side of Grand island. As these unite below the island, the stream spreads out to 2 or 3 m. in width, and appears like a quiet lake studded with small low islands. About 16 m. from Lake Erie the current grows narrow and begins to descend with great velocity. This is the commencement of the rapids, which continue for about a mile, the waters accomplishing in this distance a fall of 52 ft. The rapids terminate below in a great cataract, the descent of which is 164 ft. on the American side and 150 on the Canadian. At this point the river, making a curve from W. to N., spreads out to an extreme width of about 4,750 ft. Goat island, which extends down to the brink of the cataract, oc-

cupies about one fourth of this space, leaving the river on the American side about 1,100 ft. wide, and on the Canadian side about double this width. The line along the verge of the Canadian fall is much longer than the breadth of this portion of the river, by reason of its horse-shoe form, the curve extending up the central part of the current. The waters sweeping down the rapids form a grand curve as they fall clear of the rocky wall into the deep pool at the base. The space between this sheet of water and the wall widens near the bottom, the strata being there of a loose shaly character, and consequently hollowed out by the continual action of the spray. A cave (called the Cave of the Winds) is thus formed behind the fall, into which on the Canadian side persons can enter and pass by a rough and slippery path toward



Falls of Niagara.

Goat island. Among the great cataracts of the globe that of Niagara stands preëminent for the enormous volume of water that is carried over so high a precipice. There are many cataracts which descend from greater heights, but the sublimity of Niagara is in the vast power displayed by a mighty current descending down the long rapids, and finally plunging in one unbroken sheet into the deep abyss below. In the deep chasm below the fall the current, contracted in width to less than 1,000 ft., is tossed tumultuously about, and forms great whirlpools and eddies as it is borne along its rapidly descending bed. Dangerous as it appears, the river is here crossed by small row boats. On each side of the gorge the walls rise almost perpendicularly from the talus of fragments piled up along their base, and access to and from the summit is had only by means of stairways constructed at several points. For

7 m. below the falls the narrow gorge continues, varying in width from 200 to 400 yards. The river then emerges at Lewiston into a lower district, having descended 104 ft. from the foot of the cataract. Several objects of interest are met with in this portion of its course. About 2 m. below the falls is a suspension bridge, thrown across the gorge at the height of 245 ft. above the water, and supported by towers upon each bank, the centres of which are 821 ft. apart. The current is here about 350 ft. wide. The bridge was constructed in 1855 by Mr. Roebling for the passage of railway trains, and 18 ft. below the railway it also sustains a carriage and foot track. From this bridge a fine view is had of the falls. A suspension bridge about $\frac{1}{2}$ m. below the falls was finished in 1869 at a cost of \$175,000; it is 1,190 ft. from cliff to cliff, and 1,268 from tower to tower, and is 190 ft. above the river,

Three miles below the falls the river, bending toward the Canadian side and contracted to a width of about 220 ft., rushes violently into a deep depression in the steep cliff on that side, from which it emerges, turning back almost at a right angle into the American side. This depression presents the appearance of having been hollowed out by a great eddy or whirl of the waters, and is known as "the whirlpool." It seems to be a portion of the bed of an ancient channel, now filled with diluvium. The surface of the country, which at the foot of Lake Erie is low, scarcely rising above the level of its waters, gradually becomes more elevated toward the north, till near Lewiston it is 38 ft. higher than Lake Erie. The course of the Niagara river is thus in the direction of the ascent of this inclined plane, and must originally have been induced by a depression in the surface. Beyond this there occurs a sudden descent toward Lake Ontario of 250 ft., down to the plateau upon which stands on the American side of the river the village of Lewiston, and on the Canadian that of Queenston. The high land forms a bold terrace looking out upon Lake Ontario, from which it is 7 m. distant, and from its foot the surface descends so gently to the lake that the fall, amounting to 120 ft., is hardly perceptible. The fall made by the river in this lowest portion of its course is only 4 ft., not impeding navigation.—The gorge through which the Niagara river flows below the falls, amounting at the terrace to about 366 ft. in depth, bears evidence of having been excavated by the river itself. In the short period, hardly reaching back into the last century, during which observations other than those of passing travellers have been made and preserved, changes have taken place by the falling down of masses of rock, the effect of which has been to cause a slight recession of the cataract, and extend the gorge to the same amount upward toward Lake Erie. Thus in 1818 great fragments descended at the American fall, in 1828 at the Horse-shoe fall, and since 1855 several others, which have materially changed the aspect of the falls. Table rock, once a striking feature, has wholly disappeared. Previous to the careful trigonometrical survey made in 1842 under the direction of Prof. James Hall, for the state geological survey, no marks nor monuments had been fixed, by which the rate of recession could be ascertained. The results of this survey, with the map of the falls, are presented in the state geological report of Prof. Hall. In this report is a facsimile of a view of the falls by Father Hennepin, made in 1678. This sketch and the accompanying description present a striking feature in the falls which has now entirely disappeared; this is a third fall from the Canadian side toward the east, facing the line of the main fall, and caused by a great rock that turned the divided current in this direction. In 1750 the falls were visited by Kalm, a Swedish naturalist, whose description and view

were published in the "Gentleman's Magazine" in 1751; he alludes to the rock having fallen down a few years previous, and indicates the spot in his sketch. From such evidences it is certain that changes have been and are taking place, which have excavated the great gorge, and will carry it further up toward Lake Erie. But the rate at which these changes take place is not uniform. For several successive years there will be no apparent change; and then, the soft underlying strata having been gradually worn away, great masses of the upper and harder ones fall down, causing a very noticeable change in a very brief time. Taking long periods, the estimate of Lyell that the retrocession of the falls has been about a foot a year appears to be approximately correct. From the variable nature of the strata over which the river flows, the circumstances that affect the rapidity of the cutting action differ all along its course. At the present site of the falls sheets of a hard limestone rock, of the formation known as the Niagara limestone, cover the surface of the country, and form the edge of the cataract to the depth of between 80 and 90 ft. Under this, extending to the foot of the fall, are the shaly layers of the same formation. All these strata slope downward against the current of the river at the rate of about 25 ft. in a mile; and in the rapids above the fall the uppermost layers of the Niagara limestone succeed, one stratum above another, till about 50 ft. more is added to the thickness of the formation, when all disappear beneath the outcropping edges of the next series above, which is that of the shales and marls of the Onondaga salt group. In the other direction, toward Lake Ontario, these strata gradually rise to higher levels, till along the great terrace the capping is of the lower 20 ft. of the Niagara limestone, below which the shaly strata form the next 80 ft. of the steep slope; and next appears a succession of calcareous layers, shales, and sandstones, belonging successively to the Clinton and Medina formations. Through these piles of strata the river has worked its way back, receding probably most rapidly where, as in its present position, the lower portion of the cutting was composed of soft beds, which being hollowed out let down the harder strata above; and less rapidly where the strata near the base were hard sandstones, such as occur in some of the lower groups. The effect of continued recession must be to gradually diminish the height of the falls, both by the rising of the bed of the river at their base and by the slope of the massive limestone to a lower level. The thin-bedded limestones above being swept off, the succeeding shales and marls of the Onondaga salt group must immediately follow, and the falls may then become almost stationary, when their base is at the base of the massive sandstone and their upper line is as now over its upper edge. This, as shown by Prof. Hall, is likely to be the case after a further recession of about 2 m., and the height

of the fall must then be reduced to about 80 ft. On both sides of the river, and especially on Goat island, are beds of sand, gravel, and clay, evidently deposited by running water, containing great numbers of fresh-water shells of the same genera and species as those now living in the river and deposited along its banks, such as the *unio*, *cyclas*, *limnea*, *planorbis*, *valvata*, and *melania*. These strata reach to the height of 40 ft. above the top of the fall, and are met with in occasional patches at the same level near the edges of the precipice for 4 m. below. They show that the waters must have spread over a wide area and been kept back by some high barrier between the whirlpool and Lewiston. The bowlder or drift formation underlies the fluvial strata, thus referring their formation to the latest geological period.—The most complete accounts of Niagara falls are contained in the report of Prof. Hall, and in vol. i. of "Travels in North America," by Sir Charles Lyell. See also "Niagara, its History, Geology, and Poetry," by George W. Holley (New York, 1871).

NIAGARA, a W. county of New York, bounded N. by Lake Ontario, S. by Tonawanda creek, and W. by Niagara river; area, about 500 sq. m.; pop. in 1870, 50,437. The surface is undulating, except on the border of the lake, where it is low and level. The soil is productive and highly cultivated. It is traversed by the New York Central railroad and branches, and by the Erie canal. The chief productions in 1870 were 961,303 bushels of wheat, 396,642 of Indian corn, 790,243 of oats, 215,988 of barley, 236,026 of potatoes, 296,458 lbs. of wool, 25,463 of hops, 1,392,038 of butter, 57,596 of cheese, and 52,916 tons of hay. There were 12,218 horses, 11,594 milch cows, 7,952 other cattle, 53,362 sheep, and 11,964 swine. The number of manufacturing establishments was 421, employing \$2,968,605 capital; value of products, \$5,411,933. The most important were 16 flour mills, 25 saw mills, 2 woollen mills, 6 manufactories of agricultural implements, 32 of carriages and wagons, 51 of cooperage, 1 of edge tools, 1 of glass ware, 1 of hosiery, 6 of forged and cast iron, 7 of machinery, and 2 of paper. Capital, Lockport.

NIAGARA, a town of Niagara co., New York, on the Niagara river, extending above and below the falls; pop. in 1870, 6,832. It contains two incorporated villages, Niagara Falls, at the falls, and Suspension Bridge, formerly Niagara City, about a mile below. Their prosperity depends largely upon the great numbers of tourists that resort to the falls.—**NIAGARA FALLS** (pop. in 1870, 3,006) is connected with Buffalo and Suspension Bridge by branches of the Erie and New York Central railroads, and with Drummondville on the Canadian side of the river by a suspension bridge. It contains a paper mill, two grist mills, several planing mills and machine shops, including the repair shops of the New York Central railroad, a banking and exchange office, four large and

seven smaller hotels, two public school buildings with graded schools, a young ladies' institute, a weekly newspaper, and five churches. —**SUSPENSION BRIDGE** (pop. in 1870, 2,276) is the port of entry of the collection district of Niagara. It is one of the western termini of the New York Central railroad, and is connected with Clifton (the eastern terminus of the Great Western railroad) on the Canadian side of the river by a suspension bridge for railroad and ordinary travel. It contains a grist mill and some small manufacturing shops, a banking and exchange office, one large and eight smaller hotels, a public school building with graded schools, two weekly newspapers (one masonic), and three churches.

NIASSA. See **NYASSA**.

NIBELUNGENLIED, or *Nibelungennot*, an old German epic poem, embodying several cycles of heroic traditions. Its legends form a large part of the *Heldensagen* of Germany, and are found with various modifications in other Germanic and Scandinavian poems. It begins by telling how King Günther in Worms reigned over the Burgundians. He had a sister, Chriemhild, the world's wonder, of rare grace and beauty. She forswears marriage in consequence of a dream; but the gallant Sigfried, who had vanquished the ancient fabulous royal race of the Nibelungen, and taken away their immense treasures of gold and gems, comes to Worms to woo her. He is welcomed, triumphs over all the knights who venture to meet him, wins her heart by his valor, but has begun to despair of success when Günther hears of the beautiful and redoubtable Brunechild, queen of Isenland, and resolves to stake his fortune as her suitor. The condition is that he shall engage in three combats with her, and if vanquished be put to death. Sigfried accompanies and aids him, being promised the hand of Chriemhild if successful. The united heroes reach their destination after a voyage of twelve days. Brunechild appears in the lists with a shield of beaten gold, so heavy that four of her chamberlains can scarcely bear it. Günther is in despair, when the touch and voice of an invisible person by his side give him courage for the fight. The same person seizes his arm, hurls the spear, and flings the stone, till the martial maid confesses herself vanquished, and bids her vassals do homage to Günther. Sigfried, the real winner of the contest, who had been made invisible by his magic cap, receives for his reward the hand of Chriemhild, and the two marriages are celebrated amid the utmost pomp and rejoicing. Dissension ensues between the queen and her sister-in-law. Sigfried contrives to obtain the girdle of the former, and to present it to the latter, who afterward tells the whole tale of her husband's valor, and charges her rival with love for him and infidelity. The queen vows revenge, and secures the aid of the fierce Hagen, who skilfully draws from Chriemhild the secret of the spot where alone Sigfried was mortal, and soon after

treacherously plunges a lance between his shoulders in a royal chase. After this Chriemhild lives at Worms for thirteen years, Hagen having sunk all her Nibelungen treasure in the Rhine. Then Etzel (Attila), king of the Huns, seeks her in marriage, and she consents, in order that she may avenge the death of Sigfried. After seven years of repose in Hungary she persuades Etzel to invite Günther and his heroes to visit him. They accept, and go with a retinue of 10,000 men. At the castle of Rüdiger, ambassador of the king, they are hospitably entertained. Provided with gifts, they advance into Etzel's land, who receives them with honor. A tumult results in a dreadful battle in which many of the heroes on both sides are slain, and Etzel and Chriemhild are barely rescued from the hall in which the Burgundians were raving with Berserkir rage. The hall is then assailed by 20,000 Huns. Günther seeks a reconciliation, but rejects the proffered terms requiring the surrender of Hagen, and the queen orders the edifice to be set on fire. Only 600 Burgundians survive the conflagration. The contest is renewed by Rüdiger, and numerous heroes are so nearly matched that they slay each other, until at last of all the Burgundians only Günther and Hagen remain, who are delivered in bonds to Chriemhild. She demands of the latter where the Nibelungen treasure is concealed, but he refuses to betray it so long as one of his lords lives. The head of Günther is struck off, but Hagen still declares that he alone of men knows the secret, and that he will not reveal it. She then with the sword of Sigfried beheads him by a blow, but the Hunnish warrior Hildebrand disdains to see a hero fall beneath a woman's hand, and slays the queen; and Etzel and Dietrich survive alone to lament the dead.—The action of the poem extends over thirty years, and it abounds in passages of remarkable beauty. The origin of the traditions embodied in it is usually attributed to the Scandinavians. They are contained in the Edda, the Brynhilda, Gudrun, and Sigurd of which are only the personages of the Nibelungenlied in different outlines. Johannes von Müller ascribes the authorship of the Nibelungenlied to Wolfram von Eschenbach; Bodmer to Kunrat, a scribe of Bishop Pilgrim of Passau, and in a later view to Marner; Adelung to Konrad of Würzburg; Zeune to Klingsor von Ungarland; A. W. von Schlegel to Heinrich von Ofterdingen; Von der Hagen to Walther von der Vogelweide; Karl Roth to Rudolf von Ems; Gärtner to the prelate Chuonrad; Heinrich Haas to Wirnt von Gravenberg; Karl and Nikola Mosler to Friedrich von Hausen; and Franz Pfeiffer to Kürenberg; but not one of these critics has been able to establish his opinion. Lachmann endeavored to show that the Nibelungenlied consists of 20 songs, originally unconnected and independent of each other, and of various dates. According to Holtzmann, the Nibelungenlied is the work of a single poet, and did not ori-

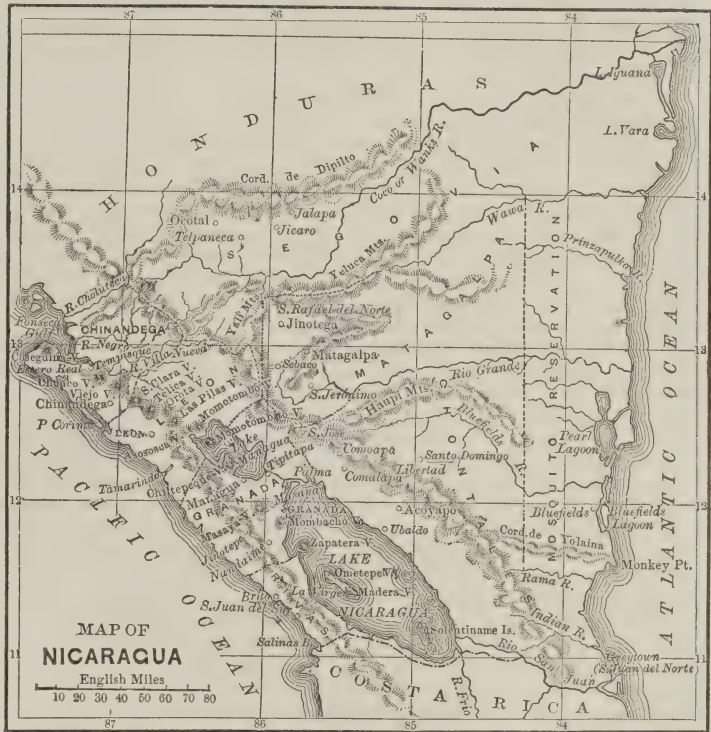
ginate by joining several national songs, though founded on the traditions then current, and traceable to the myths and legends common to all Indo-European races. As to the time of the composition of the poem, opinions vary from the 10th to the beginning of the 13th century.—See Lachmann, *Ueber die ursprüngliche Gestalt des Gedichtes von der Nibelunge Not* (Berlin, 1816); Mone, *Einleitung in das Nibelungenlied* (Heidelberg, 1818); Von der Hagen, *Minnesinger* (Leipsic, 1838); Spaun, *Heinrich von Ofterdingen und das Nibelungenlied* (Linz, 1840); Holtzmann, *Untersuchungen über das Nibelungenlied* (Stuttgart, 1854); Zarncke, *Beiträge zur Erklärung und Geschichte des Nibelungenliedes* (Leipsic, 1857); Gärtner, *Chuonrad und das Nibelungenlied* (Pesth, 1857); Haas, *Die Nibelungen in ihren Beziehungen zur Geschichte des Mittelalters* (Erlangen, 1860); Karl and Nikola Mosler, *Der Nibelunge Noth* (Leipsic, 1864); Bartsch, *Untersuchungen über das Nibelungenlied* (Vienna, 1865); Pfeiffer, *Freie Forschung—Kleine Schriften zur Geschichte der deutschen Literatur und Sprache* (Vienna, 1867); Zupitza, *Ueber Franz Pfeiffer's Versuch* (Oppeln, 1867); Schults, *Der gegenwärtige Stand der Nibelungenfrage* (Schleiz, 1874); and Fischer, *Die Forschungen über das Nibelungenlied seit Lachmann* (Leipsic, 1874). There are English translations by Birch and Letsam. The best translation into modern German is by Simrock (new ed., Stuttgart, 1874).

NICANDER, a Greek poet of the middle of the 2d century B. C. He was a native of Claros in Ionia, and succeeded his father as priest in the temple of Apollo. Of his voluminous works only two poetical treatises are extant, one on venomous animals, the other on poisons and their antidotes. The earliest edition is that of Venice (1499); the best that of J. G. Schneider (vol. i., Halle, 1792; vol. ii., Leipsic, 1816).

NICARAGUA, a republic of Central America, lying between lat. 10° 45' and 14° 55' N., and lon. 83° 15' and 87° 38' W., bounded N. by Honduras, E. by the Caribbean sea, S. by Costa Rica, and W. by the Pacific ocean; area, about 58,000 sq. m.; pop. now estimated as low as 250,000. Capital, Managua. The N. boundary line with Honduras is unsettled, but the Coco river is generally considered as the separating line. Nicaragua has nearly the form of an isosceles triangle, whose base is Costa Rica and the Pacific coast, and whose apex is at the mouth of the Coco river. The E. coast, which lies nearly N. and S., embraces the shore of the Caribbean sea from the mouth of that river to that of the San Juan river, about 280 m. Its southern part, from the delta of the San Juan to Monkey point, has dense forests and bold rocky headlands, the mountain ranges approaching close to the water. Most of the streams here are short, shallow, and rapid. Beyond Monkey point the mountains recede inland, and the country near the sea is flat and

alluvial, forming broad savannas, which are intersected where the rivers traverse them by belts of forest. Off the coast are numerous coral keys and sandy islets, the principal of which are the Pearl islands, numbering 15 or 20; and within the coast line are many lagoons with densely wooded shores and connected by channels, which in the wet season furnish interior navigation from Bluefields lagoon to Cape Gracias. Pearl lagoon, the largest, covers an area of 200 sq. m. The bar at its entrance has but 8 ft. of water. It receives the waters of the little lake Tapac and of two or three small rivers. Near its S. end is Hog island. Bluefields lagoon, which covers a surface of 100 sq. m., has hilly shores on the west. Within its entrance, about 5 m. from the mouth of the Bluefields river, lies Casadai island, and opposite it, on the W. coast of the lagoon, is the town of Bluefields, formerly the capital of the Mosquito kingdom. The lagoon has from 4 to 6 fathoms of water, but the bar at its mouth has but 10 or 12 ft. The Mico, Escondido, or Bluefields river, and a number of smaller streams, flow into it. All the lagoons are brackish in the rainy season and salt in the dry. Other rivers on the Atlantic coast, besides the San Juan, are: Indio, Rama, Grande or Awaltara, Prinzapulka, Wawa, Brackma, Duckraw, Coco, and Wanks or Segovia. All these are rough and rapid near their sources, but smoother as they approach the sea. Most of them have different names inland. The Grande rises in the sierra of Guaguali in Matagalpa, and has a course of about 230 m., the last 90 m. of which has a depth of 15 ft., but there is a dangerous bar at its mouth. The Coco is the longest river in Central America, having a course of about 350 m. from its source in the mountains of Segovia. There are many rapids in its upper part, but it is navigable for small steamers for about 140 m. from its mouth. The only port of Nicaragua on the Atlantic is San Juan del Norte, also called San Juan de Nicaragua and Greytown, at the mouth of the San Juan river. By treaty with Great Britain, it has been a free port since

1860. The San Juan river receives a large part of the drainage of both Nicaragua and Costa Rica, its watershed extending to within a few miles of the Pacific. In the rainy season it pours out a very large volume of water, and vast quantities of earth and silt, which have formed an extensive delta, through which it seeks the sea by three channels, the Colorado, the Taura, and the San Juan. The last was formerly the main channel, but a few years ago a flood enlarged the Colorado channel, and seven eighths of the water now flows through it, in consequence of which the harbor of San Juan has filled with sand. Ships now have to



lie outside of the bar, which is very dangerous for even small boats in heavy weather, while the bar at the mouth of the Colorado has 12 ft. of water in the dry season. The obvious remedy would be to remove the town to the latter channel, but unfortunately for Nicaragua it is in Costa Rican territory. With its windings the San Juan is 120 m. long. The largest of its numerous affluents are the San Carlos and the Sarapiquí, both rising in the highlands of Costa Rica. The streams entering it from the north are all small. The width of the San Juan varies from 100 to 400 yards, and its depth from 2 to 20 ft. It is interrupted by five rapids, two of which form natural dams across the river. The San Juan derives its chief importance from the fact that it is the only possi-

ble course for the Atlantic section of the proposed Nicaraguan interoceanic canal. It was indicated as one of the four possible routes by Gomara in 1551. In 1781 the route was surveyed, by order of the Spanish government, by Don Manuel Galisteo; in 1838 by John Bailly for the government of Central America; and in 1851 by Col. Childs under the direction of the "Atlantic and Pacific Ship Canal Company." Several concessions have been made to different parties for the construction of a canal, but no practical operations have ever been undertaken. In 1873 and 1874 the route was again thoroughly surveyed by a party under the charge of Commander Lull for the United States government.—The W. coast of Nicaragua is about 200 m. long, and has a general N. W. and S. E. direction. It is nearly straight, and has but few inlets. At its S. extremity is the bay of Salinas, the N. shore of which belongs to Nicaragua and the remainder to Costa Rica. The harbors of San Juan del Sur, Brito, and Tamarinda are small and insecure. About lat. $12^{\circ} 25'$ is the bay of Corinto, formed on the south by a long peninsula and on the north by the island of Aserradores, on the end of which is the town of Corinto (lat. $12^{\circ} 28' N.$, lon. $87^{\circ} 12' W.$), the principal port of Nicaragua on the Pacific. On the mainland, N. E. of it, is Realejo, once a good port, but now almost destroyed by the growth of the mangrove trees, which are rapidly filling it up. On the most northerly part of this coast the peninsula of Chinandega forms the bay of Fonseca, the shores of which are divided between Nicaragua, Honduras, and San Salvador. At the S. E. end of the bay is the Estero Real, a long arm of the sea forming an estuary for several small rivers, of which the Villanueva is the largest. The Estero is 300 yards wide, has three fathoms of water at 30 m. from its mouth, and is free from impediments to navigation; yet Nicaragua has but two small ports in it, Playa Grande and Tempisque.—From 10 to 20 m. back from the coast line, and running nearly parallel to it, is a range of mountains, sometimes rising in high volcanic cones, and sometimes subsiding into low hills and plains of slight elevation. It seems to have been the principal line of volcanic action, and in Nicaragua is marked by the volcanoes of Coseguina (3,835 ft.), Chonco, Viejo (6,266), Santa Clara, Telica (4,190), Orota (2,665), Las Pilas (3,985), Asososca, Momotombo (7,200), Momotombita, Chiltepeque (2,800), Masaya (2,972), Mombacho (4,588), Zapotera (2,000), Ometepe (5,350), and Madera (4,190). Of these, Coseguina is remarkable for its famous eruption in 1835, when it scattered ashes over a circle 1,500 m. in diameter. Santa Clara and Telica were in eruption at the time of the conquest. A few of these peaks are still active, but most of them have long been extinct. There are many smaller extinct craters in the chain, surrounded by vast beds of lava and scoria, and numerous vents called *infiernillos*, which emit

smoke and sulphurous vapors. Nearly parallel to this range is a second mountain chain, the backbone of the continent and the true Cordillera, which enters from Honduras into the department of Segovia, and extends S. E. to the San Juan river about 50 m. above its mouth. There are several volcanic peaks in this range. It sends out numerous spurs toward the Atlantic, between which are the valleys of the streams flowing into the Caribbean sea. The principal of these subordinate ranges are the cordillera of Dipilto, which forms a part of the boundary line of Honduras, the Yali and YelUCA mountains between the departments of Segovia and Matagalpa, the Huapi range in Chontales, and the cordillera of Yolaina, which ends at Monkey point on the Mosquito coast. Between these two principal ranges of mountains lies a great interior basin, the plain of Nicaragua, about 300 m. long by 100 m. wide, containing the beautiful lakes of Nicaragua and Managua. (See MANAGUA, and NICARAGUA, LAKE.) Nicaragua is thus divided into three zones: the most easterly one, between the main mountain range and the Atlantic, a country of almost unbroken forest; the central one, between the two chains, composed of grassed savannas and the lakes; and the western, which skirts the Pacific, a country of rich and fertile soil. The sole outlet of the central basin and of the lakes which occupy it is the San Juan river, which flows from the S. E. end of Lake Nicaragua.—The mountain regions of N. Nicaragua are connected geologically with the metalliferous region of Honduras. In Segovia the rocks are generally quartz and gneiss, succeeded in many places by overlying, highly inclined, and contorted schists, with small quartz veins running through their laminae. Near Ocotal are unstratified beds of gravel, sometimes from 200 to 300 ft. thick, consisting mostly of quartz sand with numerous angular blocks of quartz and talcose schist. Many of these boulders are large, some of them 15 ft. in diameter. There are many evidences throughout this region of glacial action. Silver is found in many places, but few mines are worked; those at Dipilto are now closed. There are mines also at Jalapa, Jicaró, and Macuelizo. In Chontales are rich auriferous quartz lodes in fissure veins, running generally E. and W., and cutting nearly vertically through beds of dolerite. These veins vary greatly in thickness, a lode sometimes widening from 1 to 17 ft. in 100 yards. The gold is a natural alloy, containing about three parts of gold to one of silver. Sulphide of silver, peroxide of magnesia, peroxide of iron, sulphides of iron and copper, and occasionally ores of lead, are also found in the lodes. The mining centre of Chontales is at Libertad, in the vicinity of which more than 300 gold mines have been discovered, and several are profitably worked by English, German, and French companies. Copper, iron, lead, tin, zinc, and antimony are

found in Chontales, Matagalpa, and Segovia, and quicksilver in Chontales. A kind of brown coal has been discovered also in Chontales, but the deposits remain undeveloped. Limestone, marble, alabaster, alum, sulphur, nitre, and other minerals abound in the mountainous districts.—The climate, except among the mountains of Segovia and Chontales, is essentially tropical. The N. E. part is very damp. The rains commence in May, and continue with occasional intermission till January, when a short dry season of three months begins. Even then rain sometimes falls, and the ground in the woods is always moist and the brooks are perennial. The heaviest rains are in July and August. In September, October, and November there are spells of fine weather, lasting sometimes a fortnight. In the Nicaragua basin the wet season lasts generally from May to November. The rains occasionally last several days, but generally the showers occur late in the afternoon or at night. Weeks often elapse without a cloud. The temperature is very equable, preserving a nearly uniform range of from 78° to 88° F., occasionally sinking to 70° in the night and rising to 90° in the afternoon. During the dry season the temperature is lower, the nights are cool, and the winds sometimes chilling. Rain falls at rare intervals. The fields become parched and dry, and in the towns the dust becomes almost insufferable. This is the most healthful season, its effects being practically that of a northern winter. The climate of the Pacific coast is essentially that of the central zone.—The soil of Nicaragua is very rich, particularly on the Pacific slope, where all the plants and fruits of the tropics thrive abundantly. The central zone is essentially a pasturage country, and supports large herds of cattle, mules, and horses. Great numbers of cattle also are raised on the savannas of the Atlantic coast, which is generally uncultivated. In Segovia, Matagalpa, and Chontales are large cattle estates, but little care is taken in breeding, and when unusually dry seasons occur the animals die by hundreds. The amount of cultivated land is relatively small, but is ample for the support of the population. Among the staples which grow to perfection are cacao, sugar, cotton, coffee, indigo, rice, tobacco, and maize. The cacao of Granada and Rivas is said to be among the best grown, and there are large plantations of it in those departments. The sugar cane is smaller and softer than the Asiatic varieties, but richer in juice. Two crops a year, and with irrigation three, are taken, and the cane requires replanting but once in 12 or 14 years. Excellent cotton is grown, but little is now exported. Coffee is cultivated in Chontales and on the Pacific coast, and is exported to some extent. Indigo was once extensively cultivated, but the annual product is now comparatively small. The plant from which it is made is the jiquilite (*indigofera disperma*). Maize, which is the principal food

of the natives, is very prolific. It is planted in May and harvested in September; and a second crop, planted in December, is gathered in April. Wheat and barley grow in the elevated districts of Segovia and Chontales, and rice is raised in the lowlands. Tropical fruits and vegetables of many kinds abound. The most important commercial vegetable productions are caoutchouc, sarsaparilla, annatto, aloes, ginger, vanilla, ipecacuanha, arrowroot, copal, cowhage, gum arabic, copaiba, and dragon's blood. Nicaragua is especially rich in valuable woods. Besides many kinds of timber trees, there are of cabinet woods the mahogany, rosewood, granadillo, and ronron; of dye woods, Nicaragua wood, logwood, fustic, sandal (*santalum rubrum*), moran (*morus tinctoria*), quercitron, and nanzite (*Malpighia puniceifolia*); of medicinal trees, the copaiba, liquidambar, balsam of Peru, cascarrilla, cinchona, and sassafras. Other valuable commercial trees are the *castilloa elastica*, from which India rubber is made, the gutta percha tree (*sapota bassia*), dragon's blood, quillay, nacascolo (*Cesalpinia coriaria*), biza Orellana, and several which produce gums. Along the rivers the trees grow close to the water's edge, supporting flowering vines, which cover the highest tops and form a wall of sweet-smelling flowers of every hue. Among the wild animals are the black and spotted jaguar, the puma, ocelot, tapir, two species of deer, wild boar, peccary, capybara (*hydrochaerus capybara*), coyote, sloth, fox, several species of monkeys, manatee or sea cow, porcupine, armadillo, cone, opossum, weasel, skunk, and bat. The rivers and swamps abound with alligators and iguanas. The latter, which are frequently 3 ft. long, are eaten by the Indians. There are also many other species of lizards, among them a venomous one. Snakes are numerous, but not many are venomous. The coral snake, marked with rings of yellow, black, and red, is said to be fatally venomous, as is also the bite of a small yellow snake about 8 in. long. A species of boa, sometimes 15 or 16 ft. long, is occasionally found. On the coast are many wading and aquatic birds, among which the pelican, white crane, and brown jacana are most conspicuous. Other indigenous birds are the curassow, eagle, hawk, egret, vulture, turkey buzzard, grouse, pigeon, duck, parrot, trogon, toucan, tanager, motmot, macaw, quail, oriole, many species of the humming bird, and others less known. In the interior is sometimes found the quescal (*trogon resplendens*), the royal bird of the Aztecs. Altogether 150 species of birds have been classified. The forests abound with insects, among which are numerous species of butterflies, 13 of honey bees, and more than 300 of longicorn beetles. Mosquitoes swarm in all damp places, and wasps are numerous and troublesome. There are many varieties of the ecitons, or foraging ants, which move in large armies and live on other insects, larvæ, and the young of birds.

There are also hunting ants an inch long, and leaf-cutting ants (*acodoma*). Whole groves of orange, mango, and lemon trees are frequently destroyed by the last. The seas, rivers, and lagoons swarm with every variety of tropical fish, and all kinds of shell fish abound on the coasts and keys.—Nicaragua is divided into seven administrative departments, viz.: Chinandega, Chontales, Granada, Leon, Matagalpa, Rivas, and Segovia. The E. boundary of Chontales, Matagalpa, and Segovia is considered to be the Atlantic, notwithstanding the Mosquito reservation on the coast, the limits of which, according to the convention of Managua of Jan. 28, 1860, are as follows: N. the Wawa river, E. the Atlantic, S. the river Rama, and W. the meridian of $84^{\circ} 15' W.$, containing an area of nearly 9,000 sq. m. Of the 250,000 inhabitants of Nicaragua, 220,000 belong to civilized and 30,000 to uncivilized races. The former may be divided proportionately as follows: Indians of unmixed blood, 550 in 1,000; mestizos (ladinos from whites and Indians, zambos from negroes and Indians, and mulattoes from whites and blacks), 400; whites, 45; negroes, 5. The ladino element predominates in Jalapa, Ocotal, Matagalpa, Corinto, Leon, Libertad, Managua, Bluefields, Acoyapa, Rivas, and San Juan del Sur; the mulatto in Granada, Nandaime, San Carlos, and San Juan del Norte. Masaya is almost entirely Indian, and Indians occupy a large part of the basin of the two lakes. The coast basins of the Pacific are peopled by Indians of Aztec descent. The uncivilized Indian tribes occupy the river basins of the Atlantic slope: the Pantasmas, Poyas, and Carcas, in the several upper basins of the Coco, Rio Grande, and Mico, the lower basins of which are peopled by Mosquitos, zambos, and black Caribs; and the Wawas, Toonglas, and Ramas, in the upper basins of the rivers of the same names. Most of the Nicaraguans live in towns, many going daily long distances to their plantations, which are often reached by paths so obscure as to escape the notice of travellers. The chief occupation is the raising of cattle, and large quantities of cheese are made on some of the estates. The Indians, who are generally a sober race, are the principal producers. The half-breeds as a class are indolent, thriftless, and ignorant. Baptism is considered indispensable, but the marriage ceremony is often omitted. Petty thefts are common, but robberies and murders are unusual. Every few years a revolution breaks out, the population divides into two parties, and all business is suspended until the insurgents are put down or a change of rulers is effected.—Ways of internal communication are limited. There are roads from Managua to Leon and Chinandega, and to Granada and Rivas, passable for carriages only in the summer. There is also a macadamized road from San Juan del Sur to the port of La Virgen, on Lake Nicaragua, which was built by the old Central Amer-

ican transit company. The roads in other parts of the country are little better than mule tracks. The Nicaragua mail steam navigation company have now four good steamers running on the San Juan river, and a steamer and a schooner on Lake Nicaragua. The Central American and Mexican steamers touch at San Juan del Sur and Corinto, and the British mail steamers at San Juan del Norte. In 1873 a concession was granted for the construction of a railway from Granada to Leon, and another for a railway from Leon to the bay of Corinto.—The commerce of Nicaragua is small. The principal exports are sugar, cotton, indigo, coffee, India rubber, cheese, cacao, melada, Brazil wood, cedar, tortoise shells, and coconuts; imports, dry goods, groceries, liquors, hardware, and miscellaneous merchandise. The total value of exports for the year ending Sept. 1, 1873, was: San Juan del Norte, \$977,918 48; Corinto, \$463,587 40. The value of the imports for the same year was: at San Juan del Norte, \$1,007,309 18; Corinto, \$528,771 40. The greater part of the commerce is with Great Britain. The trade with the United States was: exports, \$215,852 30; imports, \$233,050 44. The total tonnage of vessels entered at San Juan del Norte in the same year was 42,463 tons; Corinto, 8,617 tons.—The government consists of a president, elected for four years, and a congress of two chambers, a senate and a house of representatives, the former consisting of 10 and the latter of 11 members. The president is assisted by four ministers, viz.: of finances; of foreign affairs, agriculture, commerce, and public instruction; of war, public works, and fine arts; and of the interior, justice, and ecclesiastical affairs. The judicial power is vested in a supreme court, divided into two sections, one of which sits at Leon and the other at Granada. There are also a civil and a criminal judge in each department except those thinly populated, where the two are combined in one official, and in the towns alcaldes and other officers, who have limited judicial powers. The army consists nominally of 6,000 men, including 4,800 foot, 400 horse, 500 artillery, and 300 staff officers; but seldom more than 1,000 are under arms. Nicaragua has no navy, and there are no light-houses or buoys on her coasts. Each port has a governor intendant. The finances are in a deplorable condition. The revenue is derived mostly from import duties, a monopoly on rum, tobacco, and gunpowder, and a tax on slaughtered cattle. The total annual revenue is about \$1,200,000. The expenditure is chiefly for the maintenance of the army and the government departments, and the payment of the interest on the national debt, which amounts to about \$4,000,000.—Education is in a low condition. In 1868 a decree was passed making radical changes in public instruction, but the reform was only on paper. There are two so-called universities: that of Leon, which in 1872 had faculties of law, medicine, and theology,

with 56 students, and an intermediate course with 102 students; and that of Granada, which had a faculty of law, and an intermediate course with 162 students. In the same year there were in the republic 92 male primary schools, with 3,871 pupils, and 9 female primary schools, with 532 pupils. Education is wholly secular, the supreme direction being in the hands of the executive. Instruction is gratuitous, and teachers are paid from the public funds. There is no public library in the country, no museum, and no newspaper. According to the constitution, the religion of the state is the Roman Catholic, and the republic is ecclesiastically a suffragan bishopric subordinate to the archbishop of Guatemala. There are 117 parishes, of which about 100 have incumbents. There are no religious orders, all convents having been suppressed in 1829. Freedom of worship is guaranteed to other sects by treaties with friendly nations. The Moravians have a church and a mission school at Bluefields, and several schools at other places on the Mosquito coast; in all eight schools, with about 500 pupils of both sexes. There is no other Protestant church in Nicaragua.—The earliest inhabitants of Nicaragua were probably Toltecs, who entered the country from Mexico and extended their dominion over the region comprised in it and Costa Rica. They were followed at a much later date by the Aztecs, who established themselves on the lakes and country between them and the Pacific. In 1502 Columbus sailed down the coast. In 1521 Gil Gonzales de Avila entered the country from the south with a small force, and penetrated as far as the site of Granada, but, encountering large bodies of natives, prudently retraced his steps. He found on the borders of the great lake a cacique named Nicarao, and he called the lake after him *Nicarao agua*, a name afterward applied to the whole region. Pedrarias Davila, governor of Panama, desirous of anticipating the expected results of this expedition, sent in 1523 a large force into the country under Francisco Fernandez de Cordova, who founded Granada and Leon. Pedrarias became the first governor, and was succeeded by his son-in-law Rodrigo de Contreras. Nicaragua was first included in the *audiencia* of Santo Domingo, and then in that of Panama, but in 1541 with the rest of Central America was erected into a separate government. In 1549 Hernando and Pedro de Contreras, sons of Rodrigo, rebelled against the authority of the crown and proclaimed the independence of Spanish America. They reduced Panama, but while on their way to capture Nombre de Dios met with misfortunes which resulted in their death in 1550. Nicaragua, then attached to the *audiencia* of Guatemala, maintained a general state of peace, disturbed by occasional irruptions of the buccaneers, until the revolution of 1821, which resulted in its independence, together with that of the other provinces of the *audiencia*. Shortly

after all Central America became a part of the empire of Mexico; but in 1823, on the fall of Iturbide, independence was again declared, and Nicaragua became one of the states of the united provinces of Central America. After various changes, this union was finally dissolved in 1839, since which time Nicaragua has had a separate existence. A constitution was adopted in the same year. In 1847-'8 it became involved in a dispute with Great Britain in regard to the Mosquito territory. Great Britain had retained a foothold in this territory since 1740, notwithstanding various treaty stipulations with Spain. In 1825 one of the native chiefs was formally crowned at Balize "king of the Mosquito nation," and at his death he appointed as regent the British agent at Balize, who was recognized by his government as acting in its behalf. Thenceforth Great Britain claimed a protectorate over the kingdom, and in 1848 seized the port of San Juan and made an attempt to extend the protectorate over all the adjacent coast. This led to a diplomatic quarrel with the United States, which joined the Central American republics in refusing to acknowledge the claims of Great Britain. The acquisition of California had made the question of practical importance, as San Juan was regarded as the probable Atlantic terminus of the interoceanic canal. The occupation of San Juan by Americans engaged in opening the transit line to California at length led to a settlement through the Clayton-Bulwer convention of July 4, 1850. By the convention of Managua in 1860, between Nicaragua and Great Britain, San Juan was constituted a free port, and Nicaragua assumed the protectorate over the Mosquitos on the withdrawal of the English, with the understanding that they should recognize the sovereignty of the republic, the king and his successors to exercise a purely administrative authority. The king was to receive from Nicaragua annually \$5,000 for ten years, from 1860 to 1870; but he died in 1864, and the republic refused to recognize his successor, and stopped the payment of the subvention. In 1855 a civil war broke out, and the country was divided into two governments, with capitals respectively at Leon and Granada. The liberals called in the aid of Col. William Walker of California, who, at first successful, was finally overthrown by a coalition of the other Central American states. (See WALKER, WILLIAM.) After his expulsion the government was reestablished, and in 1858 a new constitution was adopted. Nicaragua took an active part in the struggle between Guatemala and San Salvador, which resulted in the shooting of President Barrios and the death of Carrera in 1865. Since then the country has been comparatively quiet. P. Chamorra was elected president in 1875.

NICARAGUA, Lake, a body of fresh water in the republic of Nicaragua, lying between lat. 10° 57' and 12° 9' N., and lon. 84° 42' and 85° 53' W. It is about 110 m. long, and 46 m. broad

in its widest part, its general form being an ellipse, whose greater axis lies nearly N. W. and S. E. It has an elevation of 129 ft. above low tide in the Pacific, from which it is separated by a range of low hills, which at one place are only about 48 ft. above the lake level. The distance between it and the Pacific, at the nearest point, is about 11 m.; between it and the Atlantic, 65 m. It is 28 ft. lower than Lake Managua, with which it is connected by the Rio Tipitapa or Estero de Panaloya. Many streams empty into it. On the east the principal of these are the Tule, Camastro, Tepenaguasapa, Oyate, Ojucuapa, Acoyapa, Mayales, Tecolostote, and Malacatoya; on the west, the Ochomogo, Gil Gonzales, Las Lajas, and Sapoa; on the south, the Tortuga, Negro, Viejo, Zapotero, Niño, and Frio. The largest is the Rio Frio, which rises in the Guatuzos mountains in Costa Rica. The sole outlet of the lake is the San Juan, which leaves it at its S. E. extremity and flows into the Atlantic. It has numerous islands, the principal of which are Ometepe and Zapotera. Ometepe, which belongs to the department of Rivas, is 20 m. long, and consists of two parts connected by a narrow isthmus. On the N. part are the volcano of Ometepe and the Indian villages of Alta Gracia and Moyogalpa; on the S. part, the volcano of Madera. The island of Zapotera, which belongs to the department of Granada, is nearly 6 m. long, and is the base of the volcano of Zapotera. It is not now inhabited, but numerous ruins show that it was peopled in ancient times. At the S. end of the lake is the archipelago of Solentiname, now deserted, but susceptible of cultivation. Other smaller groups are the San Bernardo and Nanzital, on the E. coast, and Las Isletas or Los Corales, near Granada on the W. coast. There are more than 100 of the latter, which lie at the foot of the volcano of Mombacho. The principal harbors on the lake are Granada and the Charco Muerto, the latter a fine bay between the island of Zapotera and the coast. Other ports are San Jorge and La Virgen on the W. coast, and San Carlos, San Miguelito, San Ubaldo, Los Cocos, and several smaller ones, on the E. coast. In its deepest part Lake Nicaragua has about 45 fathoms of water, but its depth is very variable, and near its outlet it does not exceed from 5 to 10 ft.; at a proper distance from the coasts and islands its depth is ample for all purposes of navigation. It has currents, but they are weak; their general direction is not known. When the N. E. trade winds blow from the Caribbean sea, the waves roll high, and the water is piled up on the S. shore, sometimes overflowing the low lands. These trade winds are intermittent, and the waters rise with them in the evening and fall with them in the morning, which gave rise to the notion entertained by the early chroniclers that the lake had a tide. Lake Nicaragua forms a part of the course of the proposed interoceanic canal, *via* the San Juan river and Lake

Managua, and its waters are amply sufficient to supply the summit levels of a canal of any dimensions demanded by the exigencies of commerce. The lake, which was called Cocibolca by the natives, was discovered in 1521 by the Spaniards, who called it *Nicarao agua*, after an Indian cacique whose village stood on its western shore.

NICARAGUA WOOD. See BRAZIL WOOD.

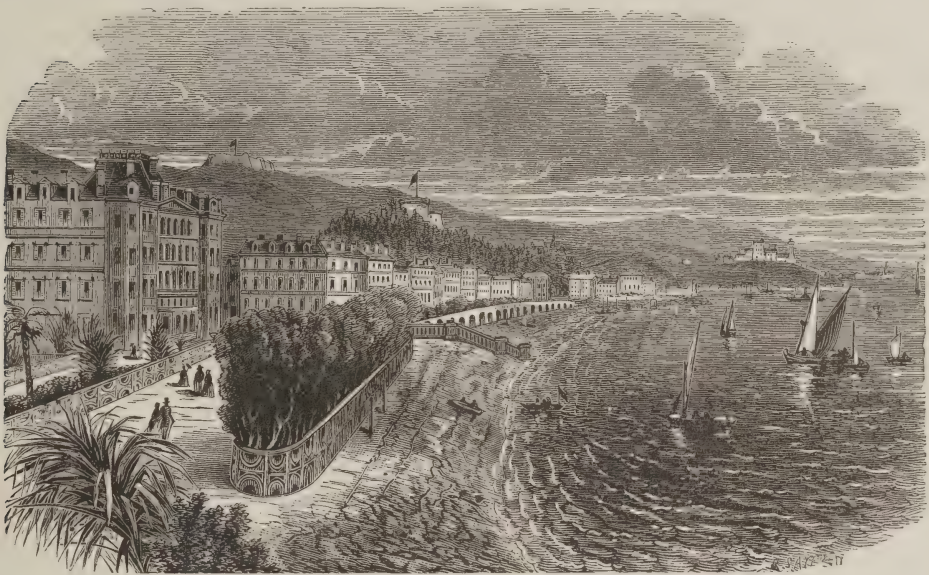
NICCOLINI, Giovanni Battista, an Italian poet, born at San Giuliano, near Pisa, Oct. 31, 1785, died in Florence, Sept. 20, 1861. He studied at the university of Pisa, and in 1807 was made librarian and professor of history and mythology in the academy of fine arts in Florence. His dramatic works are *Polissena, Ino e Temisto, Medea, Edipo, Matilda, Nabucco*, and *Antonio Foscari*. His "Lessons on Mythology" was published in 1855. He left an unfinished "History of the House of Swabia" and a large number of poems. An edition of his works was published in Florence in 1847, but did not include two of his most celebrated plays, *Arnaldo da Brescia* and *Filippo Strozzi*. The publication of a new edition was commenced at Turin in 1862.

NICEA. See NICE, in Bithynia.

NICE (Ital. *Nizza*). **I.** A former administrative division of the kingdom of Sardinia, bounded N. and E. by Piedmont, S. E. by the Mediterranean, and W. and S. W. by the French departments of Basses-Alpes and Var. In 1860 the larger part of Nice was ceded by Italy to France. That part of it retained by Italy now forms the province of Porto Maurizio. The part ceded to France, together with a small portion of the department of Var, was united into a new department called Alpes-Maritimes. **II.** A seaport town of France, capital of the department of Alpes-Maritimes, on a narrow plain between the Alps and the Mediterranean, and on both sides of the mouth of the river Paillon or Paglione, 98 m. S. S. W. of Turin, in lat. 43° 42' N., lon. 7° 17' E.; pop. in 1872, 52,377. The port is small, but admits vessels drawing 15 ft. of water, and is protected by two moles, one of which is surmounted by a battery and a lighthouse. The oldest part of the town lies on the E. side of the river. It has narrow streets, but from its centre rises a hill 800 ft. high, the summit of which, formerly occupied by a castle, is now laid out in public pleasure grounds. Parts of the old town have been greatly improved of late years. The W. division is called the "quarter of the marble cross," from a monument commemorative of the reconciliation of Charles V. and Francis I. in 1538 through the intervention of Pope Paul III. It is inhabited chiefly by English, who have here a chapel and two cemeteries. The houses are neat and encompassed by gardens; and there are two public squares, one of which is surrounded by colonnades. The town contains a cathedral of the 17th century, a national college with a botanical garden attached to it, a public library, a zoological museum, a

theatre, baths, hospitals, and convents. There are manufactories of silk, cotton, paper, oil, tobacco, perfumery, soap, and leather, and a considerable trade in those articles and in wine and fruit. Nice is a free port, and there are steamers three times a week to Marseilles and Genoa. It is chiefly noted as a watering place and resort for English invalids, who frequent it in such numbers that they have produced a complete change in the aspect of that part of the town which they inhabit. As many as 5,000 or 6,000 British visitors are found here

in the winter, besides a large number of Russians, Poles, French, Germans, and Americans. The climate is remarkably mild and salubrious, and the suburbs, which lie among the low hills a mile or two inland, are particularly delightful. The greatest drawback is a dry wind called the *mistral*, which at times blows from the Alps. But the temperature is regular; there are no sudden changes, and the atmosphere is clear and pure. The mean annual temperature, deduced from 15 years' observations, is $60\frac{1}{2}^{\circ}$, the extremes being in January



Nice, from the Promenade des Anglais.

and August, $27\frac{1}{4}^{\circ}$ and $88\frac{1}{4}^{\circ}$ respectively. The climate, however, is not considered favorable for persons afflicted with pulmonary complaints. The language of Nice is a dialect of the Provençal called the Nizzard, which may be heard in its greatest purity in the neighboring rural districts. In the town French is generally spoken, and the vernacular is much corrupted.—Nice is built near the site of the ancient Ligurian town of Nicæa, founded by the Phocæans of Massilia; and even after both became subject to the Romans it continued to be dependent for municipal purposes upon its parent city. In the 12th century Nice was the capital of an independent county, and in 1388 it became a dependency of the house of Savoy. In 1543 it was captured by the French and the Turks under Khair ed-Din Barbarossa, who were however unable to reduce the citadel. It was taken by Catinat in 1691, and by the duke of Berwick in the service of Louis XIV. in 1706. It fell into the hands of the French in 1793, but was restored to Sardinia in 1814. Nice was ceded with Savoy to France by the treaty of March 24, 1860, subject to the consent of the inhabitants by bal-

lot. The vote, taken on April 15, resulted in a large majority in favor of annexation.

NICE, or **Nicæa** (now *İznik*), an ancient city of Asia Minor, in Bithynia, situated on the E. shore of Lake Ascania, 54 m. S. E. of Byzantium or Constantinople. It was said to have been colonized by Bottiæans, who called it Ancore, and having been destroyed by the Mysians was rebuilt after the death of Alexander the Great by Antigonus, who named it Antigonea. Lysimachus changed this appellation to Nicæa in honor of his wife. It became a place of great importance, and disputed with Nicomedia the title of metropolis of Bithynia. Under the Byzantine emperors it was long a bulwark against the Arabs and Seljuks, the latter of whom conquered it about 1080. Before the end of the century it was taken from them by the soldiers of the first crusade, but it was restored at the next treaty of peace. In 1204, Constantinople having become the seat of a Latin empire, Theodore Lascaris made Nicæa the capital of a Greek kingdom or empire in western Asia, comprehending Bithynia, Mysia, Ionia, and a part of Lydia. He was succeeded by John Ducas Vatatzes (1222-'55), Theo-

dore II. (1255-'9), John Lascaris (1259), and Michael Palæologus, who in 1261 transferred the seat of power to Constantinople. In 1330 the city surrendered to Orkhan, and was incorporated with the recently founded Ottoman empire. The modern town is a place of no importance, comprising fewer than 200 houses and about 1,000 inhabitants.

NICE, Councils of, two general councils of the church held at Nice or Nicæa in Bithynia, of which the first is usually reckoned as the first of the series of general councils. **I.** The first council of Nice, according to the most probable account, opened on May 20, 325, and closed on Aug. 25; according to others, it lasted from June 9 to the end of July. It is of universal and permanent interest, both for the great significance of the subjects brought before it and the lasting influence of its determinations, and as the beginning of active participation on the part of the secular power in measures affecting the doctrine and discipline of the church. The letters summoning the bishops were issued by the emperor Constantine, and the sixth general council (680) expressly declares that it was convened by him and Sylvester, bishop of Rome; but the statement as regards Sylvester is disputed. The object of convocation was to suppress the Arian heresy and the schism of Meletius in Egypt, and to settle the differences about the proper time of celebrating Easter. About 318 bishops, nearly all orientals, with inferior clerics to the number of 2,000, attended. The emperor was present at the principal sessions, which were held in a church up to July 3, and afterward in a hall of the imperial palace prepared for the purpose. The question of who were the presiding officers is much disputed. Baronius, with the latest historian of the council, Hefele, and Roman Catholic writers generally, contend that Hosius, bishop of Cordova, with the Roman priests Vitus and Vincentius, presided as the legates of Sylvester, pointing out that in all the lists of signatures extant the names of these three personages precede all the others. But Tillemont and most Protestant historians deny the fact of their having so presided. According to the Greek historian Socrates, the interval between May 20 and the first solemn session of June 14 was occupied in discussing the doctrines of Arius, who was supported by 15 bishops, chief among whom were Eusebius of Nicomedia and Theognis of Nice. The orthodox bishops had for spokesmen Athanasius, then archdeacon of Alexandria, Alexander, a priest of Constantinople, and Marcellus, bishop of Ancyra. The Semi-Arian or middle party was represented by the historian Eusebius, bishop of Cæsarea, and thence called Eusebians. (See **ARIANISM**.) Two formulas of belief were submitted and discussed. The one, drawn up by Eusebius of Cæsarea, was characterized by the omission of the word *ὁμοούσιος*, "consubstantial," intended to express that the Son was begotten of the Father's substance; the other, of unknown

authorship, was adopted by the council, and has since been known as the "Nicene Creed." In the most ancient and authentic form it corresponds with this latter as far as the words "and in the Holy Ghost." After these is added a solemn anathema formally condemning the chief points of the Arian doctrine. The remaining articles of the Nicene creed, as we now have it, were added subsequently by the council of Constantinople in 381, with the exception of the words "and from the Son" (*filiogue*), after the clause "who proceedeth from the Father." The *filiogue* was added by the western churches, first in Spain, then in Gaul and Germany, about the 5th century, and adopted by the church of Rome in 1014, though by no formal and official declaration. The Easter controversy and the Meletian schism were then disposed of, and 20 canons were enacted regulating various points of church discipline; among others, the jurisdiction of the great patriarchal sees. A law was also introduced compelling married clerics to separate from their wives, but was withdrawn at the remonstrance of the Egyptian confessor Paphnutius. **II.** The seventh general council, convened by the empress regent Irene, with the concurrence of Pope Adrian I., to condemn the errors and excesses of the Iconoclasts. (See **ICONOCLASTS**.) The council first met in Constantinople Aug. 1, 786, but, on account of the violent opposition it met with, was adjourned to Nice, where it opened Sept. 24, 787, and closed Oct. 13. From 330 to 387 bishops, besides about 130 abbots, attended. Tarasius, patriarch of Constantinople, presided. Seven sessions were held. It was decreed that the cross, and images in colors, or in mosaic work or any other material, of Christ, his mother, saints, and holy men, might be set up on walls and tablets, in churches, houses, and highways, and used on sacred vessels and vestments; and that they should be treated as pious memorials, venerated, and kissed, but not with the honor and worship due to God alone.

NICÉRON, Jean Pierre, a French author, born in Paris, March 11, 1685, died July 8, 1738. He was a member of the order of Barnabites and a relative of Jean François Nicéron, the writer on optics. After teaching Latin and rhetoric in provincial colleges, he devoted himself to the preparation of his *Mémoires pour servir à l'histoire des hommes illustres de la république des lettres, avec un catalogue raisonné de leurs ouvrages* (43 vols. 12mo, Paris, 1727-'45), the last four volumes of which were published by Père Oudin, Michault, and the abbé Goujet. The work is valuable for information, but has slight literary merit.

NICHOL, John Pringle, a Scottish astronomer, born in Brechin, Jan. 13, 1804, died in Rothesay, Sept. 19, 1859. He was the son of a bookseller, and at the age of 16 taught school at Dun. He studied for the ministry, and was licensed to preach, but gave up his profession for scientific pursuits, and became professor of

practical astronomy in the university of Glasgow. He was a successful popular lecturer on his favorite science. He wrote "The Architecture of the Heavens" (8vo, 1838); "Contemplations on the Solar System" (1844); "Thoughts on some Important Points relating to the System of the World" (1846); "Exposition and History of the Planet Neptune" (1848); "The Stellar Universe: Views of its Arrangements, Motions, and Evolutions" (12mo, 1848); "The Planetary System, its Order and Physical Structure" (8vo, London, 1851); and "Cyclopædia of the Physical Sciences" (1857).

NICHOLAS. I. A central county of West Virginia, intersected by the Gauley river, a branch of the Great Kanawha, and drained by Meadow river and Buffalo creek; area, 880 sq. m.; pop. in 1870, 4,458, of whom 31 were colored. It has a mountainous surface and a soil not generally productive. The chief productions in 1870 were 10,242 bushels of wheat, 101,300 of Indian corn, 38,365 of oats, 3,029 tons of hay, 18,838 lbs. of wool, 164,990 of butter, and 12,589 gallons of sorghum molasses. There were 1,073 horses, 1,600 milch cows, 4,144 other cattle, 8,171 sheep, and 5,291 swine. Capital, Summerville. **II.** A N. E. county of Kentucky, intersected by Licking river and drained by its branches; area, about 300 sq. m.; pop. in 1870, 9,129 of whom 1,244 were colored. It has a diversified surface, rugged in the north and undulating in the south, the latter portion being very fertile. The Blue Lick spring, celebrated for its mineral waters, is in this county on the banks of Licking river. The chief productions in 1870 were 39,397 bushels of wheat, 24,638 of rye, 665,795 of Indian corn, 68,304 of oats, 2,345 tons of hay, 83,994 lbs. of tobacco, 25,796 of wool, 163,448 of butter, and 21,380 gallons of sorghum molasses. There were 4,314 horses, 1,729 mules and asses, 2,477 milch cows, 4,978 other cattle, 9,032 sheep, and 16,566 swine; 2 distilleries, 4 flour mills, and 6 saw mills. Capital, Carlisle.

NICHOLAS, the name of five popes and one antipope, of whom the following are the most important. **I. Nicholas I.**, the Great, and Saint, born in Rome about 800, died there, Nov. 13, 867. He belonged to the Conti family, and was elected pope April 24, 858. In 860, having received ambassadors from the Greek emperor Michael III., and letters from Photius, the usurper of the patriarchal see of Constantinople, urging him to acknowledge the latter as lawful patriarch, Nicholas sent two legates to Constantinople to inquire into the facts of the case, and report to himself, forbidding them to pronounce any decision. The legates were persuaded to approve of the deposition of the lawful patriarch, Ignatius; but the pope cancelled their action, and called upon all the eastern churches to sustain this sentence. This led to the final rupture between the Greek and Latin churches. (See **PHOTIUS**.) Lothaire, king of Lorraine, having put away his wife Theutberga, and obtained

from two synods of bishops a sentence authorizing this divorce and his marriage with Waldrada, his concubine, Theutberga appealed to the pope. Nicholas summoned a court to meet at Metz (863), before which Lothaire and Theutberga were enjoined to appear. The court was only empowered to hear the case, and to report the facts to the pope. But Lothaire, who meanwhile was publicly married to Waldrada, obtained a decree sanctioning the nuptials. Nicholas annulled the decree, but the partisans of Lothaire appealed to the emperor Louis, then present with his army in Italy. He espoused the cause of Lothaire, and marched upon Rome, but fell sick, and, considering this as a sign of the divine anger, employed the mediation of the empress to become reconciled with the pope. Lothaire offered to go to Rome to justify his conduct; but Nicholas refused to see him, and required that he should put away Waldrada and take back Theutberga. This Lothaire did in 865, when he and his wife were solemnly crowned by the papal legate. Lothaire, however, soon renewed his connection with Waldrada, and accused the queen of adultery. The pope again interfered, in January, 867, and both king and queen were about to go to Rome when he died. Two councils presided over by Hincmar, archbishop of Rheims, in 863, had deposed Rothrad, bishop of Soissons, and imprisoned him for appealing from this sentence to the Roman see. After a long controversy with Hincmar and King Charles the Bald, Rothrad was allowed to go to Rome, and was reinstated in his office without opposition. In 865 Nicholas received an embassy from the recently converted Bogoris, prince of the Bulgarians; and in 866 he sent the ambassadors back with two legates, and a letter containing 106 answers to as many questions submitted to him by Bogoris. Nicholas is praised by historians for his unblemished life, as well as for his active charity. **II. Nicholas V.** (**TOMMASO PARENTUCELLI**, called also Tommaso da Sarzana), born at Sarzana, near Genoa, in 1398, died in Rome, March 24, 1455. He was ordained priest at 25, filled several diplomatic offices under successive popes, was created cardinal by Eugenius IV., became archbishop of Bologna in 1445, was sent as legate to Frankfort in 1446, and was elected pope March 6, 1447. He began his pontificate by remodelling the Vatican library, and concluding with Germany a concordat which abolished some abuses relating to the collation of benefices; by soliciting the aid of all Christian princes and peoples in favor of Cyprus, threatened by the Turkish forces; and by urging anew the Greek emperor to seek in a religious and political union with western Christendom the safety of his empire. In 1449 he prevailed on the antipope Felix V. to terminate the western schism by abdicating the papacy. In 1452 he crowned the emperor Frederick III. and his wife at Rome; and a year afterward, upon the fall of Constantinople, he published a bull calling on all

Christians to unite against the Turks. He abandoned in favor of this crusade all the revenues of the church, the tenths due to his treasury, and all the imposts of which he had the disposal. His generosity and the assistance of Alfonso, king of Sicily, enabled him to place a large force in the field under Scanderbeg, who gained several important victories. He also displayed great munificence in welcoming the Greek refugees, and providing honorable employment for their men of letters. He purchased the manuscripts of every description saved from the sack of Constantinople, encouraged the translation into Latin of all the great literary monuments of Greece, enlarged the great Roman schools, embellished Rome with sumptuous buildings, and may be said to have founded the Vatican library. When the plague which ravaged Italy in 1449 and 1450 forced the pope to fly from Rome, his temporary abodes in Fabriano, Spoleto, Assisi, and Tolentino were filled with men of letters, booksellers, and bookbinders. In December, 1452, he frustrated a conspiracy formed against his life. He succeeded in terminating the feuds which had so long disturbed Italy, and gave its people several years of peace. He was free from the charge of nepotism, and an enemy to all duplicity and hypocrisy.

NICHOLAS I. (NIKOLAI PAVLOVICH), emperor of Russia, born in St. Petersburg, July 6, 1796, died there, March 2, 1855. He was the third son of Paul I. by his second wife, a daughter of the duke Eugene of Würtemberg. With the exception of political economy, he showed little interest in scientific attainments, but was quick in mastering foreign languages. From the peace in 1815 to his accession in 1825, he devoted himself to military matters, but never gave evidence of any real strategical capacity. In 1816 he visited England and the Russian provinces. On July 13, 1817, he married Charlotte of Prussia (Alexandra Feodorovna), eldest daughter of Frederick William III.; she gave birth on April 29 (O. S. 17), 1818, to the present emperor Alexander II. About 1821 the family pact was secretly agreed upon, by which his elder brother Constantine renounced the succession in his favor. Nicholas, however, on the news of the death of the eldest brother, the emperor Alexander I. (Dec. 1, 1825), took the oath of allegiance to Constantine, and did not assume the reins of power until the latter had publicly signified his determination not to reign. The accession of Nicholas became the signal of a formidable insurrection, in the suppression of which the new emperor showed personal courage and presence of mind, but an unrelenting disposition. Capital punishment, abolished by the empress Elizabeth, was inflicted by Nicholas upon the leaders of the insurrection. Four were publicly executed, one after another, in St. Petersburg. The fifth was the poet Rileyeff. The rope broke, and he fell to the ground still alive. The sight of his agony created such sympathy

in the assembled multitude, that the governor general sent for instruction to the emperor. The command of Nicholas was: "Take a stronger rope and proceed with the execution." The other parties to the insurrection were banished to Siberia, some for life, and others for 20 years or for shorter periods; but the sentence of none of them was ever commuted. The brilliant victories of Paskevitch and Diebitsch over Persia and Turkey in 1827-'9 added prestige to his government, especially as the Turkish war also saved the independence of Greece, as well as the autonomy of the Danubian principalities, which were now reorganized under a Russian protectorate. The revolution of 1830-'31 in Poland terminated in the annihilation of Polish nationality. These events, accomplished in rapid succession, surrounded Nicholas with a halo of glory. He now for some time relaxed the rigor of the censorship, combated the venality of public men, and ordered the codification of the laws. But the temptations of power caused him to relapse into rigid absolutism; and Russia soon presented again the spectacle of a vast empire ruled by the iron hand of a single man. The United Greeks, who acknowledged the authority of the pope while preserving the usages of the Greek church, were compelled to unite with the orthodox establishment; the Protestants of the Baltic provinces were persecuted; and the Jews were subjected to a barbarous treatment. He indirectly supported Don Carlos in Spain, but considered Dom Miguel of Portugal a usurper. During the political complications in connection with the conflict between the viceroy of Egypt Mehemet Ali and the sultan, Nicholas secured his predominance in the East by a speedy intervention against the advance of Ibrahim Pasha in 1833, and acted in alliance with England and the German powers in 1840. In 1844 he paid a visit to Queen Victoria, and subsequently he visited the emperor of Austria, and in 1846 Pope Gregory XVI. The attempted Polish rising of 1846 was suppressed with little bloodshed. He abstained from interfering during the political excitement of 1848, except in the Danubian principalities, until his assistance was invoked by the emperor of Austria against the Hungarians, whose revolution was in 1849 crushed by the aid of Russian troops. In the East, Nicholas followed the traditions of his house in his wars of conquest in Persia, the Caucasus, and Turkey. His ambition of gaining preponderance in Turkey was constantly perceptible during his reign, and led in 1853 to the rupture with Turkey, which resulted in the war with England and France. The repeated defeats and losses of his armies and fleet produced a deep effect upon his powerful constitution, and hastened his death, the more immediate cause of which was atrophy of the lungs. Nicholas had a commanding presence, and great capacity for labor and endurance. He travelled day and night to inspect fortresses and review troops,

and he worked at times 14 and 16 hours a day. His temperance and frugality were as remarkable as his industry; to create a prestige was his constant object, whether in his own capital or foreign countries. The church, the army, and the secret police were the great engines of his government. In the latter part of his reign he suppressed liberal studies, while the universities of the empire, maintained with great ostentation, were devoted to educating men in sciences useful in war or in administration. He was strenuously opposed to the liberty of the press in Russia. He was an excellent husband and father.

NICHOLAS, Saint, bishop of Myra, born in Patara, Lycia, died about 340. He is invoked as the patron of sailors, merchants, travellers, and captives, and the guardian of schoolboys, girls, and children. He takes rank in the Greek church immediately after the great fathers. Justinian dedicated a church to him in Constantinople about 560; he has been revered in the West since the 10th century, and became one of the favorite patron saints of Italy and northern Europe about the beginning of the 12th. His feast is celebrated on Dec. 6. In works of art St. Nicholas is represented with three children, or three purses, or three balls symbolical of the purses.

NICHOLS, Ichabod, an American clergyman, born in Portsmouth, N. H., July 5, 1784, died in Cambridge, Mass., Jan. 2, 1859. He graduated at Harvard college in 1802, and from 1805 to 1809 was tutor there in mathematics. On Jan. 7, 1809, he was ordained as associate pastor of the first Congregational church in Portland, Me., and was sole pastor from 1814 to 1855, when he received a colleague, and afterward, though retaining his pastorate, resided in Cambridge. He received the degree of D. D. from Bowdoin college in 1821, and from Harvard college in 1831; and he was for many years one of the trustees of Bowdoin college. He was also for several years vice president of the American academy of arts and sciences. In 1830 he published a work on natural theology, and he left a work nearly ready for the press, entitled "Hours with the Evangelists" (2 vols. 8vo, Boston, 1859-'64), which embraces an argument for the Christian revelation and miracles, directed mainly against the Straussian theory, and a series of critical and philosophical comments on the principal epochs in the life of Jesus. A volume entitled "Remembered Words from the Sermons of the Rev. I. Nichols" appeared in Boston in 1860.

NICHOLS, John, an English printer, born in Islington, Feb. 2, 1745, died in London, Nov. 26, 1826. At an early age he was apprenticed to the learned printer William Bowyer, and succeeded to the business on his death in 1777. His "Biographical and Literary Anecdotes of William Bowyer, Printer, F. S. A., and of many of his Learned Friends" (4to, 1782), was recast in 9 vols. 8vo under the title of "Literary Anecdotes of the Eighteenth Century"

(1812-'15), and the series further continued by himself and his son, John Bowyer Nichols, under that of "Illustrations of Literary History" (8 vols. 8vo, 1817-'58). From 1778 till his death he was editor and publisher of the "Gentleman's Magazine."

NICIAS, an Athenian general of the latter part of the 5th century B. C. He was several times associated with Pericles in command, gaining a reputation for prudence and incorruptibility; and on the death of Pericles he was conspicuous as the opponent of Cleon and other demagogues. He early gained a reputation for mildness, liberality, and piety; but his timidity and superstition made him an object of ridicule. He sacrificed every day, associated much with diviners, and kept a soothsayer in his own house that he might know the will of the gods both in public and private affairs. In the Peloponnesian war he was distinguished rather for prudence than genius, but was almost always successful. He conquered the island of Minoa in 427, ravaged the island of Melos and the Locrian coast in 426, gained a victory over the Corinthians in 425, and in conjunction with two colleagues captured the island of Cythera, belonging to Lacedæmon, in 424. But on the death of Cleon a treaty was concluded with the Spartans, called the peace of Nicias (421). Nicias and Alcibiades were now open rivals, and the demagogue Hyperbolus strove to procure the banishment of one or the other of them; but through their united efforts Hyperbolus himself was ostracized. In 415 the Athenians, in spite of Nicias, resolved to send an expedition to Sicily. Nicias, Alcibiades, and Lamachus were appointed to the command; but Alcibiades was soon recalled, Lamachus was slain before Syracuse, and Nicias was left to conduct operations alone. At first he was successful, but on the arrival of the Spartan commander Gylippus with succors for the town, he sent home for reinforcements and permission to resign. Reinforcements were sent under Demosthenes and Eurymedon, but the second request was refused, and Nicias continued the war, but with constantly failing fortunes. He was about to retreat when an eclipse of the moon occurred, and this Nicias regarded as an injunction from the gods to remain until the next full moon. The delay proved fatal. The Syracusans forced the Athenians to a naval engagement, destroyed their fleet, and when they attempted to escape by land pursued and captured them. Nicias and Demosthenes were put to death, Eurymedon having fallen (413).

NICKEL, a silver-white, malleable, and ductile metal, discovered by Cronstedt in 1751. It is represented by the symbol Ni; its atomic weight is 58.8, and its specific gravity is 8.279, increasing to 8.666 when forged. It is closely allied to iron and cobalt, and is associated with them in meteorites and many ores. The principal ore of nickel is the arsenide, to which the ancient miners gave the name of *Kupfer-*

nickel, or false copper, because they tried in vain to extract copper from it; and it was in this mineral that Cronstedt first detected the metal. Among the other ores of nickel are the following: 1. Pentlandite, sulphuret of iron and nickel, occurring in hornblende in southern Norway, and in gneiss at Craigmuir in Argyshire, Scotland, where it is extensively mined, and was named after Mr. Pentland. 2. Nickel vitriol, a native sulphate, often found with kupfernickel in cobalt mines. It results from alteration of nickel ores, and occurs in Galicia, Spain; near Baireuth, Germany; at the Wallace mine, Lake Huron, in crystals with pentlandite; and at Gap nickel mine, Lancaster co., Pa. 3. Nickel glance, gersdorffite, or *weisses Nickelierz*, sulpho-arsenide of nickel, found at Loos in Sweden; in the Albertine mine in the Hartz, with calcite, fluor spar, and quartz; in quicksilver near Ems; and with decomposed galenite and blende at Phoenixville, Pa. Nickel also exists in genthite, a silicate, found at Texas, Lancaster co., Pa., containing about 35 parts of silica, 31 of nickel, and 15 of magnesia; at Lake Superior; and in Malaga, Spain, with chromate and talcose schist. It also occurs in emerald nickel (*Nickelsmaragd*), which is found in chromic iron in Lancaster co., Pa., in the Shetland islands, and in Galicia, Spain. It is a hydrated carbonate of nickel with a little carbonate of magnesia. Kupfernickel occurs in the Saxon mines of Annaberg, and in Thurginia, Hesse, and Styria; in Dauphiny, France; in Cornwall, England; in Chili and the Argentine provinces; and at Chatham, Conn., in gneiss. Nickel is obtained in Birmingham from the arsenio-sulphide and from *Speiss*, a deposit formed in the pots in which arsenide of cobalt and copper nickel are fused with carbonate of potassium and pounded quartz in preparing smalt. The ore or speiss is fused with chalk and fluor spar, and the metal afterward separated by means of sulphuretted hydrogen and chloride of lime. A button of pure metal can also be obtained by heating the oxalate of nickel without further flux; and by reducing the oxide by means of hydrogen gas and fusing with borax, we can also obtain pure metal. In the United States the metal is usually obtained by roasting the powdered ore or speiss first by itself, and then with powdered charcoal, till the garlic odor of arsenic has disappeared, mixing the residue with three parts of sulphur and one of potash, and melting in a crucible with a gentle heat. The product is a sulphide free from arsenic, which being washed is dissolved in concentrated sulphuric acid containing a small portion of nitric acid. The addition of carbonate of soda causes a precipitate of carbonate of nickel, which may be reduced by heating with charcoal.—Nickel, according to Deville, is more tenacious than iron, and not much more fusible. It is magnetic at ordinary temperatures, but loses this property at 250° C., re-

covering it on cooling; burns in oxygen gas like iron, and is converted into oxide; dissolves readily in hydrochloric and dilute sulphuric acids, with evolution of hydrogen; is also soluble in nitric acid and aqua regia; and does not readily tarnish in the air. Although nickel can be hammered into thin foil, and drawn into fine wire, it is rarely used alone except as an electro-plating.—*Compounds of Nickel.* The principal alloys of nickel are: German silver, composed of copper 51, zinc 30.6, and nickel 18.4 parts in 100, and also in other proportions; *tiers-argent*, composed of two parts of nickel and one of silver; *pack-fong*, an alloy resembling German silver, brought from China nearly 200 years ago, and composed of zinc 44, copper 16, and nickel 40 per cent.; *tutenag*, another Chinese alloy, containing zinc 37, copper 46, and nickel 17 per cent. Many of the copper coins of the European continent and the United States are alloys containing various proportions of nickel. Kupfernickel, Ni_2As_2 , already mentioned as the principal ore, is a true arsenide. Sometimes a part of the arsenic is displaced by an equivalent quantity of antimony. Arsenical nickel, NiAs_2 , is another native ore, which by ignition in closed vessels parts with a portion of arsenic, and becomes kupfernickel. Nickel glance, already mentioned as an ore, has the formula NiSAs . Nickelous chloride, or chloride of nickel, NiCl_2 , is formed by treating the oxide with hydrochloric acid, by heating nickel filings to low redness in a stream of chlorine gas, or by heating the hydrated chloride. Its solution on evaporation yields beautiful green hydrated crystals, containing nine equivalents of water. There is a double salt of chloride of nickel ammonium. There are two oxides: a protoxide, NiO , and a sesquioxide, Ni_2O_3 , the first of which only forms salts. It may be obtained in an anhydrous state by calcining the nitrate or carbonate in a covered crucible, or by heating nickel filings with nitre. It is olive green, of specific gravity 5.75. It may be precipitated as a bulky green hydrate from its salts by caustic potash. It is soluble in acids, forming pale green salts. It forms insoluble compounds with baryta, strontia, and several other bases, and forms a deep blue solution with ammonia. Three sulphides are known: a subsulphide, Ni_4S , formed by reducing the sulphate by charcoal or hydrogen; the protosulphide, NiS , occurring native as millerite, or formed by fusing sulphur and nickel; and the disulphide, NiS_2 , a steel-gray powder obtained by heating to redness sulphur with carbonates of nickel and potash, and treating the mass with water. An anhydrous carbonate, NiCO_3 , is formed by heating chloride of nickel with alkaline carbonates in sealed tubes. It crystallizes in minute rhombohedrons, and is not attacked by strong acids at ordinary temperatures. The hydrocarbonate, $\text{NiCO}_3 \cdot 2\text{NiH}_2\text{O}_4$, exists in the ore emerald nickel already mentioned. Its specific gravity

is 2.67, hardness 3 to 3.25, color emerald-green with strong vitreous lustre; it gives off water when heated, and turns blackish. Nitrate of nickel, or nickelous nitrate, $\text{Ni}_2\text{NO}_3 \cdot 6\text{H}_2\text{O}$, formed by dissolving the metal in nitric acid, crystallizes in emerald-green eight-sided prisms, soluble in twice their weight of cold water, and when heated forms a basic salt. An ammoniacal nitrate, $\text{Ni}_2\text{NO}_3 \cdot 4\text{NH}_3 \cdot 2\text{H}_2\text{O}$ (Laurent), is deposited in octahedral crystals from a warm concentrated solution of nickel in ammonia. When exposed to the air the crystals give off ammonia and crumble to a bluish white powder. Sulphate of nickel, or nickelous sulphate, $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$, may be obtained by dissolving metallic nickel or its oxide or carbonate in sulphuric acid. It crystallizes in green rhombic prisms, soluble in three parts of cold water, insoluble in alcohol. When the prismatic crystals are exposed to the light, they are converted into small regular octahedrons held together in the form of the parent crystal. When the solution crystallizes between 59° and 77° F. the octahedrons form directly with six molecules of water, having a specific gravity of 2.037. A potassic nickelous sulphate also may be formed, and other double sulphates of nickel. Each molecule of nickel sulphate in the solid form will absorb six molecules of ammoniacal gas. There are several other salts of nickel, as the fluoride, bromide, iodide, phosphide, and many oxygen salts.—The salts of nickel are generally of a delicate green, both when solid and in solution; they redden litmus slightly, have a sweet metallic astringent taste, and taken into the stomach excite vomiting. With borax before the blowpipe they form a reddish yellow bead, which becomes paler on cooling. The addition of a potassium salt colors the bead blue. In the reducing flame the bead becomes gray from particles of reduced metal. Sulphuretted hydrogen gives no precipitate in a solution acidulated with sulphuric acid, but a nearly neutral solution of nickel acetate may be perfectly precipitated by this reagent with the aid of a gentle heat. Hydric ammonisulphide gives a black sulphide, slightly soluble in excess of precipitant. Ammonia gives a pale green precipitate, soluble in excess of ammonia, forming a bright blue solution, from which potash in excess precipitates a green compound of nickelous oxide and potash. Caustic potash and soda throw down a pale green bulky precipitate of hydrated nickelous oxide, insoluble in excess of alkali. The carbonates of the alkaline metals give a pale apple-green precipitate of basic carbonate of nickel, which is soluble in sesquicarbonate of ammonia. Potassic ferrocyanide gives a greenish white, and the ferricyanide a yellowish green precipitate, both soluble in hydrochloric acid.—*Nickel Plating.* The possibility of depositing nickel by means of the battery appears to have been known to Becquerel and Jacobi as early as 1862; but it remained for Isaac Adams of Boston, Mass., to invent a

method for practically accomplishing the object. Adams employs the double chloride of nickel and ammonium or sulphate of nickel and ammonium. He says the presence of even slight traces of the fixed alkalies is injurious, as they occasion the deposition of oxide of nickel. From pure salts the layers of metals are deposited with great regularity and of sufficient thickness to admit of a fine polish. According to Jacobi, the anode should be made of pure fused nickel, and Remington prefers to suspend pieces of metal in the bath. Prof. Böttger observes that porous nickel occludes hydrogen the same as palladium. Becquerel insists that the presence of a fixed alkali, such as potassa, is not at all injurious to, and in no wise affects the deposition of nickel, since the double sulphate of nickel and potassa can be applied, as well as the double sulphate of nickel and ammonia; but if the positive electrode is not made of nickel, it is necessary to add ammonia in order to saturate the sulphuric acid which is set free. A method for plating various metals with nickel without the aid of the battery, devised by Prof. Stolba, is as follows: In the plating vessel, which may be of porcelain, though the author prefers copper, is placed a concentrated solution of zinc chloride, which is then diluted with from one to two volumes of water, and heated to boiling. If any precipitate separates, it is to be redissolved by adding a few drops of hydrochloric acid. As much powdered zinc as can be taken on the point of a knife is thrown in, by which the vessel becomes covered internally with a coating of zinc. The nickel salt (either the chloride or sulphate may be used) is then added until the liquid is distinctly green; and the articles to be plated, previously thoroughly cleaned, are introduced, together with some zinc fragments. The boiling is continued for 15 minutes, when the coating of nickel is completed, and the process is finished. The articles are well washed with water and cleaned with chalk. If a thicker coating be desired, the operation may be repeated. Prof. Stolba found that copper vessels thus plated were scarcely tarnished after several months' use in the laboratory. Nickel plating has now become an industry of great importance in the United States.—Nickel is used for magnetic needles, for philosophical and surgical instruments, and in watch movements.

NICOBAR ISLANDS, a cluster in the Indian ocean, S. of the Andaman group and N. of Sumatra, between lat. $6^\circ 45'$ and $9^\circ 15' \text{N.}$, and lon. $92^\circ 45'$ and 94°E. ; pop. about 6,000. It includes nine islands of considerable size, and several smaller ones. The most important are Great and Little Nicobar, Katchall, Kamorta, Teressa, Tillanchong, and Car-Nicobar. The largest and southernmost is Great Nicobar, about 30 by 12 m., separated by a channel 6 m. wide from Little Nicobar, the next in size, which is 14 m. in length and 12 m. in width. The surface of all the islands is generally hilly

and well wooded. The soil is fertile, and capable of producing nearly all the fruits and vegetables of tropical regions. The cocoanut palm grows luxuriantly on the coral formations of the northern islands, and it is estimated that 5,000,000 cocoanuts are exported annually, three fifths of them from Car-Nicobar alone. Ambergris and edible birds' nests abound, and a limited trade is carried on in these articles by the Malays, Chinese, and English from the Straits Settlements. The inhabitants, who resemble the Malays in their characteristics, dwell in conical huts raised above the ground and reached by means of ladders. They make few or no efforts to cultivate the soil, and in many of the islands their condition is very miserable and degraded. They have frequently murdered the crews of ships which have touched on their coasts. The Danes made several attempts to colonize the Nicobars from 1754 to 1848, when they abandoned their claim to sovereignty. In 1869 the British East Indian government took possession of the islands and began a penal colony on Nancowry, where there is an excellent harbor, and regular steam communication is now kept up with the Straits Settlements. The colony is on the N. side of the harbor.

NICODEMUS, a member of the sanhedrim, who came to Jesus by night, and held with him the discourse related in the third chapter of John. Subsequently he claimed for Jesus, at a meeting of the sanhedrim, the legal right to be heard before being judged (Dent. i. 16), and also assisted Joseph of Arimathea in laying out the dead body of Christ. According to tradition Nicodemus afterward became openly a Christian, was baptized by Peter, and in consequence was expelled from the sanhedrim and driven from Jerusalem. An apocryphal gospel is attributed to him.

NICOL, Erskine, a British painter, born in Leith in July, 1825. He became an apprentice to a house painter in Edinburgh, and in his leisure hours studied at the trustees' academy. He was drawing master in the high school of Leith, and afterward practised his profession in Dublin, where he acquired his familiarity with Irish characteristics. He removed to London in 1862, and became an associate of the royal academy in 1866. He began to exhibit his pictures at the academy in 1851. Among his works are: "Did it Pout with its Betsey?" (1857); "Renewal of the Lease refused" (1863); "Among the Old Masters" and "Waiting for the Train" (1864); and "A Deputation" (1865).

NICOLAI, Christoph Friedrich, a German author, born in Berlin, March 18, 1733, died Jan. 8, 1811. His father was a bookseller, and at the age of 16 he was sent to Frankfurt-on-the-Oder to learn the same occupation. He returned to Berlin in 1752, and in 1755 published a volume of "Letters" which gained him the intimacy of Lessing and Moses Mendelssohn, with whom he commenced in 1757 the *Bibliothek der*

schönen Wissenschaften. In conjunction with Lessing he established in 1759 the *Briefe, die neueste Literatur betreffend*; and in 1765 he projected the *Allgemeine deutsche Bibliothek*, which he edited until it reached its 107th volume. In the latter part of his life Nicolai, in consequence of illness and depression of spirits, was haunted by phantoms which, as he imagined, even spoke to him; and when by the use of medicine these apparitions were dispelled, he reported to the philosophical society of Berlin a full account of the matter. His principal works are: *Charakteristische Anekdoten von Friedrich II.* (6 vols., Berlin, 1788-'92); *Leben und Meinungen des Magisters Sebal-dus Nothanker* (4th ed., Berlin, 1799); and *Beschreibung einer Reise durch Deutschland und die Schweiz* (3d ed., 12 vols., Berlin, 1788-'96). *Nicolai's Leben und sonderbare Meinungen*, by Fichte, was edited by A. W. von Schlegel (Tübingen, 1801); and his biography and literary remains, by Göckingk, were published at Berlin in 1820.

NICOLAI, Karl Otto Ehrenfried, a German composer, born in Königsberg, June 9, 1810, died in Berlin, May 10, 1849. During his childhood he learned to play the piano from his father, whose cruelty drove him from home at the age of 16. He went to Stargard in Pomerania, where he found a patron in Adler, who assisted him in his studies in literature as well as music. In 1830 he became a teacher of singing and playing in Berlin, and in 1834 organist at the ambassador's chapel in Rome. There he studied ancient sacred music, and commenced a valuable collection of manuscripts, which at his death was purchased by the royal library of Berlin. In 1839 he became for a year director of orchestra at the imperial opera of Vienna. He afterward wrote at Trieste his opera *Enrico II.*, and in 1840 he produced at Turin *Il templario*, which was performed in most of the Italian theatres. In 1841 he produced *Odoardo e Gildippe* and *Il proscritto*. He returned to Vienna in 1842, and became first chapelmaster at the imperial opera. In 1848 he was made director of the orchestra of the theatre in Berlin, and there wrote his most famous opera, *Die lustigen Weiber von Windsor*. For the commemoration of the 300th anniversary of the university of Königsberg he wrote his well known "Festival Overture," the theme of which is *Ein' feste Burg*. He also wrote a symphony, many songs, and pianoforte compositions. The character of his music is melodious, but without great force or originality.

NICOLAITANS, a heretical sect, alluded to in Rev. ii. 6, 15, and by some supposed to have received their name from Nicolas of Antioch, one of the seven deacons said to have fallen into practices opposed to the gospel and to the instructions of the apostles. According to Irenæus, who is the first Christian writer that mentions them, they held fornication and the eating of meats which had been offered to idols not to be sinful. St. Epiphanius relates

that Nicolas had a beautiful wife whom he abandoned for a life of celibacy, but afterward, unable to keep his resolution, returned to her, and justified his conduct by licentious principles, which became the basis of the Nicolaitan sect. Eusebius says that they soon became extinct, but according to Tertullian they continued to exist under another name, and their heresies passed into the sect of the Cainites. It is suggested by Mosheim that the church fathers confounded them with the Gnostics, and by Neander that the name is employed in the Apocalypse in a purely symbolical sense, and signifies seducers of the people.

NICOLAS, Sir Nicholas Harris, an English antiquary, born at East Looe, in Cornwall, March 10, 1799, died near Boulogne, Aug. 3, 1848. He entered the navy as midshipman in 1808, and was made lieutenant in 1815. On the conclusion of peace he studied law, and was called to the bar in 1825. He was chosen a member of the council of the society of antiquaries, but his imprudence and fiery temper caused him to be expelled after he had appeared once at their meeting; and he thereupon began a series of attacks on the society. In 1826 he became joint editor of the "Retrospective Review." His most important works are: "Life of Secretary Davison" (1823); *Notitia Historica* (1824), which was remodelled, under the title of "Chronology of History" (1835), for Lardner's "Cabinet Cyclopædia;" "Synopsis of the Peerage of England" (1825; new ed. by W. Courthope, "Historic Peerage of England," 1857); *Testamenta Vetusta* (1826); "History of the Battle of Agincourt" (1827); "Controversy between Sir Richard Scrope and Sir Robert Grosvenor" (2 vols., 1832, unfinished); "History of the Orders of Knighthood of the British Empire" (4 vols. 4to, 1841-2); "Observations on the Institution of the Order of the Garter," in vol. xxxi. of *Archæologia*; and "History of the Royal Navy" (2 vols. 8vo, 1847, unfinished). He prepared for Pickering's Aldine edition of the British poets the lives of Chaucer, Surrey, Wyatt, Collins, Cowper, Thomson, Burns, and Henry Kirke White, and edited the poems of Davison, the "Literary Remains of Lady Jane Grey," the "Siege of Carlaverock," the "Privy Purse Expenses of Henry VIII.," a "Chronicle of London from 1089 to 1483," "Memoirs of Lady Fanshawe, written by Herself," and the "Letters and Despatches of Admiral Lord Viscount Nelson" (7 vols. 8vo, 1844-6). When he died he was editing the papers of Sir Hudson Lowe.

NICOLE, Pierre, a French moralist, born in Chartres, Oct. 19, 1625, died in Paris, Nov. 16, 1695. He graduated at the university of Paris in 1644, and for several years held a professorship in the Port Royal community. He was one of the authors of their school books, and assisted in their controversy with the Jesuits. According to the abbé Goujet, he had a share, either by advice or correction, in several of

Pascal's "Provincial Letters," of which he made an elegant Latin translation under the assumed name of William Mendrock (Cologne, 1658). He was the principal author of *De la perpétuité de la foi de l'Eglise catholique touchant l'eucharistie*, published under the name of Arnould. He shared in the persecutions which befell the Port Royalists, and was obliged to leave Paris in 1677. His fame rests upon his *Essais de morale et instructions théologiques* (25 vols. 12mo, 1671 et seq.). There is a life of him by Goujet (1732).

NICOLET, a central county of Quebec, Canada, bounded N. W. by the St. Lawrence, and intersected by the Bécancour; area, 593 sq. m.; pop. in 1871, 23,262, of whom 22,621 were of French origin or descent. It is traversed by the Three Rivers division of the Grand Trunk railway. Capital, Bécancour.

NICOLLET, a S. E. county of Minnesota, bounded E. and S. W. by the Minnesota river; area, about 400 sq. m.; pop. in 1870, 8,362. Its surface is level, and contains several lakes, of which Swan lake is the largest. The soil is fertile. The Winona and St. Peter railroad passes through it. The chief productions in 1870 were 315,803 bushels of wheat, 83,256 of Indian corn, 264,565 of oats, 32,411 of barley, 36,158 of potatoes, 24,446 tons of hay, 5,389 lbs. of wool, 250,844 of butter, and 4,117 gallons of sorghum molasses. There were 1,879 horses, 3,189 milch cows, 788 working oxen, 3,386 other cattle, 1,619 sheep, and 1,982 swine; 2 manufactories of brick, 3 of furniture, 1 tannery, and 1 flour mill. Capital, St. Peter.

NICOLLET, Jean Nicolas, a French explorer, born at Cluses, Savoy, July 24, 1786, died in Washington, D. C., Sept. 11, 1843. He was a pupil of Laplace, and came to the United States in 1832 for a scientific tour. After exploring the southern states, he entered the great basin embraced by the sources of the Red, Arkansas, and Missouri rivers. In 1836 he had extended his observations to the sources of the Mississippi. Returning, he was engaged by the war department to revisit the far west and prepare a general report and map for the government. In 1841 Nicollet presented to the association of American geologists a communication on the geology of the upper Mississippi and Missouri. He published *Lettre sur les assurances qui ont pour base les probabilités de la durée de la vie humaine* (Paris, 1818); *Mémoire sur la mesure d'un arc de parallèle moyen entre le pôle et l'équateur* (1826); and, with Reynaud, *Cours mathématique à l'usage de la marine* (2 vols., 1830).

NICOLO DA PISA. See PISANO.

NICOMACHUS. I. A painter of Thebes, Greece, who flourished in the middle of the 4th century B. C. Cicero ranks him with Apelles and Protogenes, and Plutarch extols his genius. Pliny says he used only four colors, and that he was the first to represent Ulysses with the pileus or sailor's cap. His finest works found their way to Rome. Of these, Pliny mentions

the "Rape of Proserpine" and "Female Bachelants surprised by Satyrs." **II.** A Pythagorean philosopher of the 1st century A. D., born at Gerasa, Palestine, and hence surnamed Gerasenens. His name became proverbial in connection with skilful computation; hence the adage, "You reckon like Nicomachus of Gerasa." His extant works are an introduction to the study of arithmetic, first printed in the original Greek at Paris (1538), and a manual on music, edited by Meursius (Leyden, 1616), and with a Latin translation by Meibom (Amsterdam, 1652).

NICOMEDES, the name of three kings of Bithynia.—**Nicomedes I.** succeeded his father Zipoetes in 278 B. C., and one of his first acts was to assassinate two of his younger brothers. Another brother, Zipoetes, who rebelled and took possession of the maritime districts of Bithynia, he defeated with the assistance of the Gauls, and also put to death. He was the first ruler of the Thracian dynasty who took the title of king. He fixed his residence near the ruined city of Astacus, where he built a new capital and called it Nicomedia. He died about 250 B. C.—**Nicomedes II.**, surnamed **EPHANES**, fourth in descent from the preceding, reigned from 149 to 91 B. C. He was educated at Rome, where he found such favor with the senate that his father Prusias II., dreading his ambition, sent orders to have him assassinated. Nicomedes, discovering the plot, entered Bithynia in arms, and, being supported by the inhabitants, dethroned his father and put him to death. He made an alliance first with the Romans, whom he assisted in their war with Aristonicus (131), and afterward with Mithridates, and having seized Paphlagonia, placed it under the government of one of his sons. Foiled by Mithridates in an attempt upon the Cappadocian throne, to secure which he had married Laodice, the widow of Ariarathes VI., he was soon afterward deprived of Paphlagonia also by the Romans, and is said to have died of disappointment.—**Nicomedes III.**, surnamed **PHILOPATOR**, son and successor of the preceding, and the last king of Bithynia, died about the beginning of 74 B. C. On the death of his father, Mithridates incited another son, Socrates, to claim the crown, and Nicomedes was driven from the kingdom. Restored by the Romans the next year, he was persuaded by his allies to make war upon Mithridates, who deposed him a second time (88). At the conclusion of the first Mithridatic war (84), which broke out in consequence of this action, he was restored again. Having no children, he bequeathed his kingdom to the Romans.

NICOMEDIA, the capital of ancient Bithynia, on the Astacenean gulf, at the E. extremity of the Propontis. It was built in 264 B. C. by Nicomedes I., and for six centuries prospered, being often, under the Roman empire, the residence of the emperors while engaged in their eastern wars. It was adorned with many magnificent buildings, the ruins of which still exist,

but is especially celebrated as having been the place where the historian Arrian was born, where Hannibal and Constantine the Great died, and Diocletian abdicated. The modern name is Ismid, and the place is still of some importance. (See *ISMR.*)

NICOPOLI, or **Nicopolis**, a city of European Turkey, in Bulgaria, on the right bank of the Danube, 75 m. S. W. of Bucharest, and 280 m. N. W. of Constantinople; pop. about 10,000. It consists of the fortified or Turkish town, perched on limestone cliffs, overhanging the Danube, and an open quarter on the declivity of an adjoining height, inhabited by Bulgarians, Wallachs, and Jews. It was founded by Trajan in the beginning of the 2d century, and gives title to a Greek archbishop and a Catholic bishop. The sultan Bajazet I. defeated King Sigismund of Hungary (the future emperor of Germany) under the walls of this city, Sept. 28, 1396. The Christian army, numbering 60,000 men, among them several thousand French warriors, was totally routed, but Sigismund escaped in a boat.

NICOPOLIS, a city of ancient Greece, in Epirus, on the Ambracian gulf, built by Augustus to commemorate his victory over Mark Antony, achieved off the neighboring promontory of Actium (31 B. C.). It was peopled from the Epirotic towns, invested with the privileges of a Roman colony, and raised to the dignity of an amphictyonic city. The conqueror erected a temple to Neptune and Mars, and instituted a quinquennial festival styled *Actia*. Under his successors this city became the capital of Epirus, but it decayed in the middle ages. Numerous ruins remain, and the great theatre is one of the best preserved of Roman theatres.

NICOSIA, **Leucosia**, or **Lefkosia**, a town of Asiatic Turkey, capital of Cyprus, situated in the N. part of the island, 9 m. from the sea; pop. about 12,000, two thirds of whom are Turks. It is about three miles in circuit, and surrounded by strong walls with three gates. With the exception of the Greek quarter, the town is generally ill built with narrow unpaved streets and hut-like houses. There are some imposing buildings, among which are the mosque of St. Sophia, formerly a Christian church, the church of St. Catharine, the Armenian church, the church of St. Nicholas, now used as a grain depot, the seraglio or governor's palace, erected as a royal residence while the island was held by the Christians, and the palace of the Greek archbishop. There are manufactures of Turkey leather, carpets, and silk, and British calicoes are printed for exportation. The Cyprus wines are produced on the neighboring hills.—Nicosia in the time of Constantine the Great was 9 m. in circuit, and before Cyprus came into the possession of Venice had 300 churches. It was taken from the Venetians by the Turks in 1570, when 20,000 of its inhabitants perished.

NICOSIA, a town of Sicily, in the province and 40 m. N. W. of the city of Catania; pop.

about 15,000. It is built on a rocky crest, on the highest part of which is a ruined castle. The cathedral and other churches have fine works of art. It is the seat of a bishop, and has a royal gymnasium. There are salt works and several sulphur springs. A brisk trade is carried on in grain, wine, oil, and cattle.

NICOT, Jean, a French diplomatist, born in 1530, died in Paris, May 5, 1600. Being sent by Francis II. as ambassador to the court of Portugal, he there procured some seeds of a tobacco plant from a Flemish merchant, who had obtained them from Florida. These he brought into France, and in honor of him the botanical name *Nicotiana* was given to tobacco.

NICOTIA, or **Nicotine** ($C_{10}H_{14}N_2$), a volatile alkaloid, the active principle of tobacco, discovered by Vauquelin in 1809, and obtained by Posselt and Reimann in 1828 in a state of comparative purity. It may be prepared by the distillation of the infusion of the plant. It is a clear oily fluid, of specific gravity 1.048, soluble in water, alcohol, ether, the fixed oils, and oil of turpentine. It possesses an exceedingly acrid burning taste, even when largely diluted, and an odor like that of tobacco. Its vapor is very powerful and irritant to the nostrils; that arising from a single drop is sufficient to render the whole atmosphere of a room insupportable. Nicotia partly decomposes at 482° , and becomes brown and thick on exposure to the air. It has a strong alkaline reaction, and forms crystallizable salts with the acids. It is one of the most virulent poisons known, a drop of anhydrous and pure nicotia being sufficient to kill a dog in from half a minute to two minutes. Tannin combines with it to form a compound of little solubility, and it may therefore serve as a temporary antidote to the poison if there be time for its application. Nicotia has been used in criminal poisoning, and in the celebrated case of Count Bocarmé it was detected in the body of the victim. It protects the animal tissues from decomposition, and Orfila found it several months after death in bodies of animals destroyed by it. The proportion of the alkaloid obtained by this chemist from Havana tobacco was 2 per cent., from that of Maryland 2.3, and from that of Virginia 6.9. The empyreumatic oil of tobacco, which imparts the well known odor to old tobacco pipes, contains a large proportion of nicotia, and is a virulent poison.—Nicotianine is probably the odorous principle of tobacco. It is a fatty substance having the smell of tobacco smoke, and an aromatic, somewhat bitter taste. It produces sneezing when applied to the nostrils, and a grain of it swallowed occasions nausea. (See **TOBACCO**.)

NICOYA, Gulf of, a bay of Costa Rica on the Pacific ocean, formed by the peninsula of Nicoya, the S. point of which, Cape Blanco, is in lat. $9^\circ 37' N.$, lon. $85^\circ 7' W.$ Its mouth, between Capes Blanco and Herradura, is about 30 m. wide, and the gulf extends N. about 55 m. It contains many islands, of which the

principal are Chira, Venado, Bejuco, Castillo, and San Lucar; and numerous streams empty into it, the largest being the Rio Grande on the east and the Tempisque on the north. Punta Arenas, on the E. side of the gulf, is the only port of entry of Costa Rica on the Pacific.

NIEBUHR, Barthold Georg, a German historian, son of Karstens Niebuhr, born in Copenhagen, Aug. 27, 1776, died in Bonn, Jan. 2, 1831. He was two years old when his father removed to Meldorf in Holstein, where he passed his boyhood till 1793. He learned in the nursery both the German and Danish languages; was instructed by his father in geography, history, and English and Latin; and on entering the gymnasium of Meldorf in 1789 was advanced at once to the first class. After having passed some time in Göttingen, he was sent in 1794 to the university of Kiel, where he remained two years, and became intimately acquainted with Mme. Hensler (whose sister Amalia Behrens was his first wife), with the counts Stolberg, and with Voss and Jacobi. In 1796 he became private secretary to Schimmelmann, the Danish minister of finance, was soon after appointed secretary to the royal library by Count Bernstorff, and in 1798 went to England, and resided chiefly in London and Edinburgh for more than a year. Having received two small appointments from the government at Copenhagen, he married, and resided in that capital till 1806, directing his studies chiefly toward classical antiquity, and establishing his reputation both as a scholar and an administrative officer. In 1806 he removed to Berlin, having received an appointment as joint director of the bank, but was soon obliged to flee with the other officials after the battle of Jena. He was intrusted by Hardenberg with the financial department of the commissariat, and accompanied the army till the battle of Friedland. After the dismissal of Hardenberg (1807) he was appointed on the commission to conduct the government provisionally, and suggested fiscal reforms which were accepted by the new administration under Stein. He resided one year in Amsterdam, making unsuccessful efforts to negotiate a loan, and on his return to Berlin in 1809 was nominated privy councillor, and was made the head of the department for the management of the national debt and the supervision of the banks. The opposition made by the ministry to his financial plans caused him to demand his dismissal, and both Hardenberg and Stein attributed his conduct to an undue waywardness and impatience of disposition. His own letters prove that while the important offices to which he had been raised had given him an extravagant estimate of his financial abilities, he was nevertheless chiefly desirous to return to the literary studies from which he had been withheld by public duties. Appointed historiographer to the king, he delivered lectures on ancient Roman history in the university of Berlin in 1810 and 1811, which were immedi-

ately published, and contained the germs of his later doctrines. He was also associated with Spalding, Buttmann, Ancillon, Schleiermacher, Savigny, and a few others, in a philological society. His studies and lectures were interrupted by the events of the war of liberation in 1813-'14, by writing several political tracts, and by the subsequent illness and death of his wife; and in 1816 he sought change of scene, and went as Prussian ambassador to the court of Rome. On his way he discovered at Verona the palimpsest manuscript of the "Institutes" of Gaius. In Rome he was chiefly occupied with studies concerning its ancient history. He did not receive his final instructions as ambassador till he had been at his post four years, and the negotiations with the papal court were completed by Hardenberg in person in 1821. But the services of Niebuhr in the entire arrangement of the preliminaries were acknowledged by the court, and he was rewarded by the king of Prussia with the order of the red eagle, and by the emperor of Austria with the Leopold order of knighthood. In 1818 Bunsen became secretary of the legation, and Niebuhr was engaged in planning the work on Roman topography, which he subsequently aided Bunsen, Platner, and others in preparing. In 1822 he obtained a release from his duties, and resided chiefly in Berlin and Bonn till in 1823 he became adjunct professor of ancient history in the university recently established in the latter city. He instituted in 1827 the *Rheinisches Museum*, a periodical consisting of short philological essays by eminent scholars; superintended the republication of the *Corpus Scriptorum Historiæ Byzantinæ*, to which he furnished an edition of Agathias; and was especially occupied with revising and correcting his great work on the history of Rome, the first volume of the new edition of which appeared in 1827. It attracted general attention, and gave a new impulse to the investigation of classical antiquity. In the winter of 1829-'30 his house was burned, and with it nearly all the manuscript of his second volume, which, however, he was able to prepare again for the press within a year. The French revolution of July, 1830, caused him the deepest anxiety, and he foreboded the worst consequences from the revival of popular sovereignty. A cold which he caught on one of his frequent visits to the news rooms resulted in inflammation of the lungs, which terminated fatally after a week's illness. Niebuhr was personally remarkable for amiability, earnestness, and integrity, combined with a wayward, impatient, and impracticable temper. He had married a second time before his visit to Rome, where his son Marcus was born, whom he educated with peculiar care, and who attained to high office in the Prussian civil service, was an enemy of liberal ideas, and died in 1860.—The principal monument of the genius of Niebuhr is his *Römische Geschichte* (3 vols., 1811-'32; 2d ed., 1827-'42;

translated into English by J. C. Hare and Connop Thirlwall), which has been called the most original historical work of the present age. It was a reconstruction of Roman history, a development of historical materials from the early traditions and legends. Its aim to reproduce the fabric of history from scattered fragments, to extract truth and certainty out of traditional narratives, together with the erudition, sagacity, and power of imagination which it displayed, excited the enthusiasm of intelligent readers. In England his theories were generally accepted by scholars, and Dr. Arnold professed never to venture to differ from him except when he manifestly had evidence that had not occurred to him. Macaulay also favored his theory of the presumed derivation of early Roman history from national ballads, which has since been generally abandoned in Germany, and which Sir G. Cornewall Lewis has proved to rest on insufficient positive evidence. Another view which he brought into prominence was that the patricians and plebeians were respectively a conquering and conquered race, with different languages, feelings, and habits, yet gradually coalescing into a single body politic. Three series of his lectures have been published since his death in both German and English, respectively on Roman history, on ancient ethnography and geography, and on ancient history. They were edited by his son Marcus and Dr. Isler, from notes taken by his pupils, and also independently in English by Dr. L. Schmitz (8 vols. 8vo). His opinion that the mediæval municipal institutions of Italy were derived from the Romans, and not from the northern invaders, has been generally rejected. His principal minor writings were collected in his *Kleine historische und philologische Schriften* (2 vols., Bonn, 1828-'43), and his *Nachgelassene Schriften nicht philologischen Inhalts* (Hamburg, 1842). In 1838 appeared his *Lebensnachrichten* (2 vols., Hamburg), consisting largely of his correspondence, abridged and translated into English by Miss Winkworth, with additions by Bunsen, Brandis, and others (3 vols., London, 1852).

NIEBUHR, Karstens, a German traveller, born at Lüdingworth, Lauenburg, March 17, 1733, died at Meldorf, Holstein, April 26, 1815. He studied at Hamburg and Göttingen with a view to becoming a land surveyor, and in 1760 was appointed mathematician to an expedition sent to Egypt, Arabia, and Syria by Count Bernstorff, minister of Frederick V. of Denmark, for the purpose of illustrating Old Testament geography and natural history. He had the rank of lieutenant of engineers. The expedition sailed in January, 1761, and after touching at Constantinople proceeded to Alexandria, ascended the Nile, examined the pyramids, and went with a caravan to Suez, whence Niebuhr made an excursion to Mount Sinai. In October, 1762, they took ship from Suez to Loheia, and thence travelled by land to Mocha, where Von Haven, the philologist, died in May, 1763; and

on their journey to Sana, the capital of Yemen, they lost the naturalist Forskal. They were well received at Sana, but dreading the climate they resolved to return to Mocha, where the whole party were taken sick, but at length obtained passage to Bombay. Baurenfeind, the draughtsman, died on the voyage, and Cramer, the physician, the last of Niebuhr's companions, expired soon after their arrival. Niebuhr remained 14 months in Bombay, and then turned homeward, visiting Muscat, Bushire, Shiraz, and the ruins of Persepolis, ascending the Euphrates to the ruins of Babylon, and thence going to Bagdad and to Mosul, where he joined a caravan going to Aleppo. He passed over to Cyprus, and returning made a tour to Palestine, went with a caravan across Mount Taurus to Brusa in Asia Minor, arrived at Constantinople in February, 1767, and finally reached Copenhagen in November of the same year. He published the first fruits of the expedition in German under the title of *Beschreibung von Arabien* (Copenhagen, 1772), the government defraying the expense of the illustrations. In 1774-'8 he continued his narrative by publishing his *Reisebeschreibung von Arabien und andern umliegenden Ländern* (2 vols., Copenhagen). The third volume was not published till 1837; it bore the same title as the preceding, and contained an account of his homeward journey, through Aleppo, Jaffa, Jerusalem, and Constantinople, with brief notices of Bulgaria, Wallachia, Poland, and Germany. He contributed to a German periodical a paper on the "Interior of Africa," and one on the "Political and Military State of the Turkish Empire." He also edited Forskal's papers, *Descriptiones Animalium*, and *Flora Ægyptiaco-Arabica* (4to, 1775). The Danish government rewarded his services with the cross of Dannebrog. Toward the close of his life he became blind. His son, the historian, wrote his life (Kiel, 1817).

NIEDERMEYER, Louis, a composer, born at Nyon, Switzerland, April 27, 1802, died in Paris, March 14, 1861. He was the son of a German music teacher, and received lessons on the piano from Moscheles and in vocal music from Zingarelli. His first work, *Il reo per amore*, was represented at Naples in 1820. In 1823 he went to Paris, where most of the remainder of his life was spent. He wrote several operas, one of which, *La casa nel bosco*, was produced at the Théâtre Italien, through Rossini's aid, in 1828. In 1836 his *Stradella* was produced at the Grand Opéra; in 1844, *Marie Stuart*; and in 1853, *La Fronde*. None of these works achieved any decided success. Niedermeyer, disheartened, abandoned dramatic composition, and revived Choron's school for religious music with good results. Besides his operas, he composed many masses, motets, and other religious compositions, and a number of excellent songs.

NIEL, Adolphe, a French general, born at Muret, Haute-Garonne, Oct. 4, 1802, died in Paris,

Aug. 13, 1869. He entered the polytechnic school of Paris in 1821, and the military academy of Metz in 1823, and became a second lieutenant of engineers. In 1836-'7 he distinguished himself in the expedition against Constantine in Algeria, and was promoted, Oct. 25, 1837, to command the engineers in that province. On his return to France he gained distinction as military engineer, and was appointed colonel in 1846. In 1849 he took part in the expedition to Rome. He became general of division in 1853, commanded in 1854 the siege operations against Bomarsund, and in 1855 was appointed adjutant of Napoleon III., and was employed in the siege of Sebastopol. In 1859 he took a prominent part in the Italian campaign, and decided by the artillery under his command the victory of Solferino (June 24), after which he was made a marshal of France. In 1857 he was appointed a senator, and in 1867 minister of war, which office he held, with the exception of a few weeks, until his death.

NIEMANN, Albert, a German tenor singer, born at Erxleben, near Magdeburg, in 1831. He commenced his career as a chorus singer at Dessau, and afterward obtained distinction by means of a voice of unusual power and beauty. Most of his career has been spent in the service of the king of Hanover. He was the tenor selected by Wagner to sing in his *Tannhäuser* when it was produced in Paris in 1861; but, disgusted with the temper shown by the Parisians toward that work, he broke his engagement and returned to Hanover. He married the German actress Marie Seebach.

NIEMBSCH VON STREHLENAU. See **LENAU, NIKOLAUS**.

NIEMCEWICZ, Julian Ursin, a Polish author, born at Skoki, Lithuania, in 1757, died in Paris, May 21, 1841. He was educated in the military academy of Warsaw, and became an adjutant of Czartoryski; but he left the military service in 1788 with the rank of major, and served from 1788 to 1792 in the constituent Polish diet as a deputy of Lithuania. On the outbreak of the revolution of 1794 he fought on the side of Kosciuszko, afterward shared his imprisonment in Russia, and accompanied him in 1797 to America, where he married an American lady. After Napoleon's invasion of Poland he returned to Warsaw (1807), and was appointed secretary of the senate; and after the annexation of Poland to Russia, he became president of the committee on the new constitution. During the revolution of 1830 he was a member of the administrative council. Shortly before the fall of Warsaw he went to Paris, where he spent the rest of his life. His principal works are *Śpiewy historyczne*, or "Historical Songs of the Poles," with historical sketches (Warsaw, 1816), which attained immense popularity; history of the "Reign of Sigismund III." (1819); "Leb and Sarah," a novel in letters, illustrative of Jewish life in Poland; a historical novel, "John of Tenczyn;" and a collection of admirable tales and fables

in the style of Lafontaine. A complete edition of his poetical works was published in 12 vols. in Leipsic in 1840, but his other works, including memoirs, have not yet been collected. His *Notes sur ma captivité à St. Pétersbourg* was published in Paris in 1843.

NIEMEN, a river of Europe, rising in the Russian government of Minsk, and flowing W. to the town of Grodno, through the governments of Wilna and Grodno, then N. between those of Wilna and Suwalki to Kovno, and W. between Suwalki and Kovno, and thence through Prussia to the Kurisches Haff, an arm of the Baltic. After entering Prussia it takes the name of Memel. About 8 m. below Tilsit it divides into two branches, one of which is called the Russ, and the other the Gilge. The delta which they form, called the island of Kaukehnen, is remarkable for its fertility. The chief tributaries of the Niemen are the Wilia, Shara, and Zelva. Its entire length is about 500 m., 50 of which are in Prussia. It is the main outlet for the products of the countries through which it flows. As the snows of the regions which it drains dissolve rapidly on the approach of summer, the Niemen frequently rises 20 or 30 ft. above its ordinary level, causing great devastation. It is connected by the Oginski canal with the Dnieper and the Black sea.

NIEMEYER, August Hermann, a German author, born in Halle, Sept. 11, 1754, died in Magdeburg, July 7, 1828. He acquired distinction as a theologian and pedagogue, and in 1808 became chancellor and rector of the university of Halle. In 1816 he went to Magdeburg as consistorial councillor. His principal works are: *Charakteristik der Bibel* (5 vols., Halle, 1775-'82); *Handbuch für christliche Religionslehrer* (2 vols., 1790); *Grundsätze der Erziehung und des Unterrichts* (3 vols., 1796); and *Lehrbuch der Religion für die obern Klassen in gelehrten Schulen* (18th ed., 1843). All his works passed through many editions, especially the last on account of its prohibition.

NIEPCE, Joseph Nicéphore, a French chemist, one of the inventors of photography, born in Châlon-sur-Saône, March 7, 1765, died July 5, 1833. After serving in the army for one year, he was obliged by severe illness to resign, and was appointed civil administrator of the district of Nice, which post he held from 1795 to 1801. Retiring then to private life, he devoted himself to the study of mechanics and chemistry, and as early as 1813 made a series of investigations, which he styled "heliographic researches," to find the means of fixing images upon metallic plates by the agency of light. In 1824 he had partially succeeded in producing pictures, first on tin and polished glass, then on copper, and finally on silver, the surface having in each case been covered with a thin film of bitumen; but the process was very slow. In the mean time Daguerre had been engaged upon the same problem, and in 1829 the two experimenters entered into a copartnership to

improve the discovery, which, according to the terms of agreement, had been made by Niepce; but the latter died before it was perfected. —See *Histoire de la découverte improprement nommée daguerriotype*, by Isidore Niepce fils.

NIEPCE DE SAINT-VICTOR, Claude Marie François, a French chemist, nephew of the preceding, born at St. Cyr, near Châlon-sur-Saône, July 26, 1805, died in Paris in April, 1870. He was educated at the military school of Saumur and commissioned a sub-lieutenant of dragoons. His first chemical invention was a process by which the color of the facings of a large number of cavalry uniforms was changed from crimson to orange at a cost of half a franc the uniform. For this service, which saved the government 100,000 francs, he received a reward of 500 francs and permission to exchange into the municipal guard of Paris. The transfer was not effected until three years later, April, 1845, and in the mean while he experimented for the perfecting of the photographic process discovered by his uncle. In 1847 he communicated to the academy of sciences two papers, the first of which related chiefly to the reproduction of designs by the use of vapors of iodine, and the second announced his method of obtaining images on glass plates coated with a film of starch, gelatine, or albumen. In 1848 he announced some important improvements, and the process was soon generally adopted. In 1851-'2 he presented several memoirs on the subject of photographing colors. He had obtained upon silvered plates, washed with chloride of copper, accurate representations of a variety of colored objects, but was unable to fix the tints. In 1853 he presented to the academy an account of his process of heliography, by which he obtained the impression of the image upon a polished steel plate covered with a thin film of varnish, of which benzine was the chief ingredient, after which the picture was bit in with acid. In 1854 he was appointed commandant of the Louvre. In 1855 he published, under the title of *Recherches photographiques*, all the memoirs on photographic subjects presented by him to the academy. He never patented any of his inventions. He received the Trémont prize from the academy of sciences in 1861, '62, and '63. Among his later works are: *Mémoires sur une nouvelle action de la lumière* (1857-'8); *Mémoire sur la thermographie* (1859); and *Note sur l'action de la lumière et de l'électricité* (1860).

NIESHIN, a town of Russia, in the government and 35 m. S. E. of the city of Tchernigov, on the Ostr; pop. in 1872, 20,516, including many Greeks. It contains a cathedral, 21 other churches, a monastery, a lyceum, a gymnasium, and several schools. The principal article of trade is tobacco, which is raised in large quantities; and there is much activity in other branches of industry.

NIEUWENTYT, Bernardus, a Dutch mathematician and philosopher, born at Westgraafdyk,

North Holland, Aug. 10, 1654, died at Purmerend, May 30, 1718. He studied law, medicine, logic, philosophy, and mathematics, and, settling in the town of Purmerend, became famous as an orator, physician, and magistrate. His mathematical works enjoyed an ephemeral popularity in consequence of their attacks on the infinitesimal calculus. His most important production is his treatise on "The Right Use of contemplating the Works of the Creator" (Amsterdam, 1715), from which Paley is supposed to have borrowed the substance of his essay on "Natural Theology." It was translated into English by John Chamberlayne, under the title of "The Religious Philosopher" (3 vols. 8vo, London, 1718-'19).

NIEUWERKERKE, Alfred Émilien de, count, a French sculptor, born in Paris, April 16, 1811. He belongs to a noble family of Dutch origin, and studied the fine arts in the great collections of European artists. His equestrian statue of William the Silent, exhibited in 1843, was purchased by the king of Holland, and is in the Hague; as is his subsequent and superior statue of Descartes, of which he executed a duplicate for the city of Tours. Among his later works is an equestrian statue of Napoleon I. In 1853 he became a member of the institute, and Napoleon III. created for him the office of superintendent of fine arts, which he retained till Jan. 2, 1870, when a ministry was created for that department. He however remained in charge of the museums till the establishment of the republic, Sept. 4, 1870. He has shown much zeal in promoting art; but his success is in a measure due to his great fortune, rank, and high connections.

NIEVRE, a central department of France, comprising the old province of Nivernais, bordering on the departments of Yonne, Côte d'Or, Saône-et-Loire, Allier, Cher, and Loiret; area, 2,632 sq. m.; pop. in 1872, 339,917. It is intersected from S. E. to N. W. by the mountains of Morvan, which divide the basin of the Seine from that of the Loire, and culminate in Mont Presnay, 3,000 ft. above the sea. The surface N. of this chain is an alternation of rugged hills and deep valleys; but S. of it are extensive plains sloping gently to the Loire. The principal rivers are the Loire, Allier, Yonne, Abron, and Nièvre. The climate is mild but moist. The soil is not in general remarkably fertile. The quantity of wine made annually averages about 6,000,000 gallons. Mining, especially of iron and coal, is largely carried on. Woollen cloth, linen, and hardware are manufactured. It is divided into the arrondissements of Château-Chinon, Clamecy, Cosne, and Nevers. Capital, Nevers.

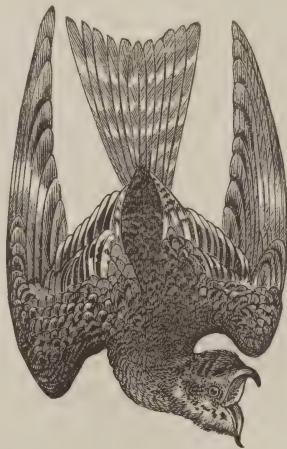
NIGER, or **Quorra**, a river of western Africa, which falls into the gulf of Guinea by several mouths, between the bights of Benin and Biafra. The Niger is formed by two principal rivers, the Benoowe or Tchadda (see **BENOOWE**) and the Joliba, the latter of which is the more western, and is regarded as the main stream.

It rises, according to Winwood Reade, in lat. 9° 25' N., lon. 10° 20' W., at an elevation of more than 1,300 ft. above the ocean, on the N. slope of Mt. Loma, in the Koranko country, about 200 m. from the coast of Sierra Leone. Thence it flows in a northeasterly direction, pursuing a very circuitous course throughout two fifths of its entire length, toward the Sahara. Near Cabra, the port of Timbuctoo, it turns E. and afterward S. E., and near the Kong mountains, in lat. 7° 47' N., lon. 7° 27' E., is joined by the Benoowe, from which point it flows S. by W. and finally S. W. till it falls into the ocean after a course of about 2,500 m. Down to a point about 40 m. distant from its supposed source, which has not yet been visited by any European, the river is known as the Teembo or Toombeenko; but below Farabana, in the Sangara country, it assumes the name Joliba, signifying great river, which is changed into Quorra in that part of its course below Timbuctoo. The upper portion of the Niger has not been thoroughly explored. At Farabana, the limit of exploration up to the present time, reached by Winwood Reade in 1869, the current of the river is swift, and about 100 yards wide. A hundred miles further down, at Babbila, where the French traveller Caillié crossed in 1827, the breadth of the river is described by the English explorer as equal to that of the Thames at London. Here it is joined by the river Yanda from the south. From this point Winwood Reade navigated the main stream down to Nora, a large town near lat. 11° N. There is but little navigation on this portion of the river, owing to the absence of large trees along its banks. Between Nora and Bammakoo the course of the Niger has not been traced, but from the latter place, in lat. 13° N., down to Timbuctoo, it is tolerably well known. The river is described as a broad and majestic stream flowing slowly eastward between low banks, and through a populous, fertile, and well cultivated country. In some parts it is studded with small green islands, many of which are inhabited. The banks are frequently flooded during the rainy season. On this portion of the river trade is carried on in boats of over 60 tons burden, worked without sails by large crews of natives. Not far from lat. 16° N. the Niger flows through Lake Debo, a distance of about 10 m. The extent of this lake westward from the river is believed to be much greater. Above Timbuctoo the river separates into two branches, which unite a little further down. Cabra, the port of Timbuctoo, is situated on the N. branch. In this vicinity, according to Dr. Barth, the river overflows the surrounding country, and consequently the climate in the neighborhood of that city, during the season of the inundation, is very unhealthy. The middle portion of the Niger extends from Timbuctoo in a southeasterly direction to Yauri, described by Richard Lander as the largest city in cen-

tral Africa, its walls enclosing a circumference of more than 20 m. In this part of its course, which must be nearly 1,000 m., its principal tributary is the Sackatoo or Rima river, which joins the main stream from the east near lat. 12° N. The town of Sackatoo is situated on this affluent. Amid the plains of Soodan the width of the Niger varies from 1 to 8 m., and the rate of its current from 5 to 8 m. an hour. Below Yauri it is 2 m. wide, and at Boossa, four days' journey further down, it is divided into three channels and obstructed by rapids. Thence to lat. 7° N. the Niger runs through a low valley in a mountainous country, and the banks are annually inundated, very fertile, and well peopled. The mountains in many places approach both sides of the river, and the valley is nowhere very wide or thickly inhabited. At a distance of about 250 m. from the sea the Niger receives the waters of the Bennoowe or Tchadda, its greatest affluent, with a volume quite equal to its own above the junction. Near lat. 6° N. the united stream leaves the mountain region and enters an alluvial plain of forest, swamp, and jungle, where it divides into three large branches, the main outlet being the Nun, which flows into the gulf of Guinea near Cape Formosa. Another arm of the delta, extending at right angles with this, is the Benin river; and the entire region between them and the sea is intersected by numerous small rivers, creeks, and lagoons. The Old Calabar river is the principal eastern branch of the delta. The oil-producing palm is an important product of this region. The area of the delta is estimated at 32,000 sq. m., and it is subject to an annual inundation, attaining its maximum height in August. It is one of the most unhealthy and pestilential tracts in the world. —The identity of the modern Niger with the Niger of Ptolemy and Strabo is now generally admitted. Ptolemy describes its upper course with an approach to accuracy, but he believed that its waters were lost in the sands before reaching the sea. Pliny regarded it as an affluent of the Nile, while Leo Africanus believed that it rose near the sources of the Nile and flowed westward. When the Portuguese explored the W. coast of Africa they discovered the rivers Senegal, Gambia, and Grande, each of which in succession they supposed to be the Niger, and explored to its source in the hope of reaching Timbuctoo. Even after the real direction of the Niger began to be suspected, it was supposed for some time to be identical with the Congo river, and Mungo Park explored it with this idea. He was the first European traveller who reached the banks of the Niger in the upper part of its course. In his first journey (1796) he traced it for about 160 m. from Bammakoo down to Silla. In his second journey (1805) he embarked upon its waters at Sego, between Bammakoo and Silla, and descended the stream to Boossa, where he was killed. The loss of many of his papers deprived the world of the information which

he had gathered, but the deficiency was subsequently partly supplied by Caillié, who sailed down the river from Jenne to Timbuctoo in 1828. In 1830 Richard and John Lander navigated the Niger from Yauri to the sea, and proved that it was not the Congo. The lower portion of the river was subsequently explored by English expeditions in 1832, 1834, and 1841. The last was a government expedition sent out for the suppression of the slave trade; an attempt was made to establish a model farm on the W. bank, opposite the mouth of the Bennoowe, but the effects of the climate were so fatal to the Europeans that after a short trial the undertaking was abandoned. In 1853 Timbuctoo was visited by the German traveller Barth, who in 1854 explored the valley of the river southward to the town of Say, in lat. 13° 8' S., lon. 2° 5' E. In 1869 Winwood Reade succeeded in reaching the head waters of the Niger, not far from the source of the river, by a journey inland from Freetown, the capital of Sierra Leone.

NIGHT HAWK, a North American goatsucker of the subfamily *caprimulginae* and genus *chordeiles* (Swains.). In the *C. Virginianus* (Swains.) the length is 9½ in., and the extent of wings about 23½; the bill is very small



Night Hawk (*Chordeiles Virginianus*).

and curved, with a wide gape furnished with a few very short hairs, and the tip hooked; the wings very long and pointed, the second quill the longest; the tail long, broad, and forked; tarsi short and partly feathered, and toes feeble; the head large and flat, the eyes and ears large, neck short, and body slender; the plumage is soft and blended. The male is greenish black above, slightly mottled on the head and back; wing coverts varied with grayish, and the scapulars with yellowish rufous; a white V-shaped mark on the throat, and terminal patch on the tail; a collar of pale rufous blotches, and grayish mottled on the breast; under parts transversely banded with rufous

white and brown; quills brown; five outer primaries with a white blotch midway between the tip and carpal joint; the female has not the white patch on the tail, and that on the throat is mixed with reddish. The common name of this bird is ill chosen, as it is not a hawk, nor does it fly by night; in cloudy weather it flies all day, and its favorite time is from an hour before sunset to dark. It is distributed over North America, appearing in Louisiana on the way to the north and east about April 1, in the middle states about May 1, in Maine about June, going even into New Brunswick and Nova Scotia, and returning to the south in autumn. The flight is rapid, light, and capable of long continuance. From the small size and backward position of the legs, it can hardly walk, or stand erect. It breeds from South Carolina to Maine; in the middle states it deposits two freckled eggs about May 20, on the bare ground, without any nest; both sexes assist in incubation, and the female adopts various devices to distract attention from her eggs or young. The food consists of insects, especially beetles, moths, caterpillars, crickets, and grasshoppers; it drinks while flying low over the water, in the manner of swallows. The flesh is esteemed as food when they return from the north in autumn, as it is then fat and juicy. It is the *C. popetue* of Baird. Other species are described.

NIGHT HERON, the common name of the division *nycticoracæ* of the family *ardeidæ* or herons. The common night heron of America is the *nycticorax naevius* (Bodd.), or *nyctiardea Gardeni* (Baird); the bill is $3\frac{1}{2}$ in. long above, very stout, curved from the base, with emarginated tip and compressed grooved sides; wings long, the second and third quills longest; tail short and even, with 12 feathers; tarsi strong, as long as the middle toe, covered with small scales; toes long and slender, united at the



Night Heron (*Nyctiardea Gardeni*).

base by a membrane, the outer the longest, and the hind one even with the others; claws moderate, slightly curved, and acute; the neck

short, with a long occipital plume of three feathers, rolled together; body slender and compressed; lower fifth of tibiae bare. The bill is black, the iris red, and the feet yellow; the head above and the middle of back steel green; wings and tail ashy blue; forehead, under parts, and occipital feathers white, passing into pale lilac on the sides and neck; the length is $25\frac{1}{2}$ in., the extent of wings about 48, and the weight nearly 2 lbs.; the adult female resembles the male, but the young are grayish brown above. It is distributed generally over the United States, residing permanently in the southern portion; in the eastern states it is called the "qua" bird from the noise which it makes. Going north in the spring, some get as far as Maine; at Hingham, Mass., and in the woods near Fresh pond, Cambridge, there used to be famous heronries, to which the birds returned year after year, until the persecutions of those in search of their young drove them away entirely, or into more inaccessible places. The nests are made of coarse sticks on bushes or trees, often overhanging the water, and are revisited and repaired annually; they congregate in large numbers in the breeding season, during which they lose their natural shyness; the eggs are usually four, 2 by $1\frac{1}{4}$ in., of a plain light sea-green color and thin-shelled. By day they are harassed by crows, hawks, and vultures, and at night by raccoons and other animals. The young birds are as tender and juicy as pigeons. They return to the south in autumn. The night heron generally remains on the low swampy lands near the coast, where it feeds upon fish, reptiles, crustaceans, water insects, leeches, and even mice and such other small animals as fall in its way. The flight is slow, steady, and long continued, with the head drawn in and the legs extended; on the ground it is very restless, and without the grace of the true herons.—The European night heron (*N. griseus*, Strickl.) is similar, but smaller, and the young have not the white spot at the apex of the quills seen in the American bird. Several other species occur in other parts of the world.

NIGHTINGALE (*Luscinia philomela*, Bonap.; the *philomela* of the ancients and *rossignol* of the French), one of the finest of European singing birds, whose melody has been celebrated from time immemorial. The genus belongs to the subfamily of warblers, from which it differs principally in its more slender shape and longer bill, tarsi, and tail; it comes near many of the smaller thrushes both in form and color, and in the character of the song. In this genus the bill is short and straight, with the culmen slightly curved, sides compressed, and tip emarginated; the gape without bristles; the wings moderate, with the first quill one third the length of the second, and the third the longest; the tail moderate, rounded at the sides; tarsi long and strong, covered in front with an entire scale; toes very long and slender, the outer longer than the inner and united at the base; hind toe long, with a curved

claw. The length is $6\frac{3}{4}$ in., the extent of wings $10\frac{1}{2}$, and the bill about $\frac{1}{2}$ in. The nightingale is very plainly colored; the upper parts are rich brown, with a reddish tinge on the back and tail; below grayish brown, with the throat



Nightingale (*Luscinia philomela*).

and abdomen whitish; the female is like the male in color, and is nearly of the same size; there is considerable variation in the reddish and grayish tints, and in the occurrence of white feathers. They begin to appear in the middle of France about the first week in April, and in England a week or ten days later; the males arrive a few days before the females, travelling singly and at night; they get mated in about a week, and commence their nests on the ground in thickets; these are rudely made of leaves and grasses, and the four or five eggs, $\frac{3}{4}$ by $1\frac{1}{8}$ in., are of a pale brownish color, sometimes tinged with grayish blue, especially at the small end; both sexes incubate. It is a migratory bird, passing the winter in northern Africa, but in the summer found over the greater part of Europe, even to Sweden and temperate Russia; it is said not to be found in Great Britain north of the Tweed. They begin to sing when mated, and continue in full song till the young are hatched; the notes are most rich at the beginning of summer, and toward the end the song becomes a single low croaking note. They are very shy, remaining concealed as much as possible among the foliage; they frequent woods, hedges, and thickets, feeding on insects and larvæ, soft berries, and fruits; the flight is short, even, and swift, but not so rapid as that of the true warblers and flycatchers which seize insects on the wing. Though the song is heard at intervals during the day, it excites the greatest admiration on quiet evenings an hour or two after sunset; when the moon is nearly full and the weather is serene and still, it may be heard till midnight, and is then exceedingly pleasing. Virgil and other classical poets, from the melancholy character of part of its song, call it *miserabile carmen*. Its natural song is certainly very sweet, but not more

so, in the opinion of Audubon, than that of the black-capped warbler, and but little if at all superior to that of the woodlark; the song of the skylark is far more spirited, more prolonged, and of much greater compass, though less sweet; the notes of the American mocking bird are very much sweeter, more varied, of greater compass, power, and duration; and many birds which naturally have no song, like the bullfinch, can be taught to sing in perfect time and tune, which the nightingale cannot. But, take it as a whole, it is superior at least to that of all British songsters. The compass of its song is only 11 or 12 notes. (See Macgillivray's "British Birds," vol. ii., p. 331, London, 1839.) The males only sing, and, like other migratory birds, never during the winter in cages, and not till after the spring moult. They are short-lived in captivity from being kept too warm and from improper food; this should be chiefly insects, or small bits of meat and fruits.

NIGHTINGALE, Florence, an English philanthropist, born in Florence, Italy, in May, 1820. She is the younger daughter of William Edward Shore, a Sheffield banker, who inherited the estates of Peter Nightingale, and in accordance with the will assumed that surname. Florence early became proficient in the classics, mathematics, modern languages, and music; but her favorite study was the methods of caring for the sick, and while a girl she visited numerous hospitals. In 1849 she underwent a course of training in Pastor Fliedner's school of deaconesses at Kaiserswerth. In 1851 she took charge of a sanatorium for infirm and invalid governesses in London, and soon brought it to a high state of efficiency. In 1854 she went to the army in the Crimea as superintendent of a corps of volunteer female nurses, 92 in number, and organized a hospital at Scutari on Nov. 5. On the 7th they received 600 soldiers wounded at Inkerman, and in three weeks the number was increased to 3,000. In the face of great discouragements Miss Nightingale soon made her hospital a model for thoroughness and perfection of arrangements, and all the other hospitals on the Bosphorus were placed under her superintendence. She suffered a severe attack of hospital fever, and returned to England in September, 1856, with broken health, which has never been fully restored. The queen sent her a jewel and a letter of thanks, a fund of £50,000 was raised to found a school for nurses under her direction, and the soldiers of the Crimean war made a penny contribution to raise a statue in her honor, which she would not permit. She has published "The Institution at Kaiserswerth on the Rhine" (1850), "Notes on Hospitals" (1859), "Notes on Nursing" (1850), "Observations on the Sanitary State of the Army in India" (1863), "Notes on Lying-in Institutions" (1871), and "Life and Death in India" (1874).

NIGHTMARE, or *Incubus*, an affection coming on during sleep, in which there is a sense of

great pressure upon the chest accompanied by inability to move. It is well known that uneasy or painful sensations occurring during sleep, when insufficient to wake the patient directly, are apt to produce disagreeable or frightful dreams. Thus persons laboring under a variety of chronic affections, particularly heart disease, upon falling asleep suffer from dreadful illusions; they are attacked by wild beasts or armed men, they are falling down precipices, &c. The same phenomenon often occurs during fever or after mental excitement attended with anxiety. The more common form of nightmare usually comes on during the first sleep, and is caused by a constrained position or by a distended stomach, which act by somewhat impeding respiration. The feeling of oppression thus caused gives rise to the nightmare, and is dispelled at once when the patient awakes, and, bringing the voluntary muscles into play, draws a full breath.

NIGHTSHADE (Ang. Sax. *niht-scada*), a name applied to several plants, but especially to *solanum nigrum*, the common or black nightshade. This is a much-branched, spreading



Common Nightshade (*Solanum nigrum*).

annual herb, 1 to 2 ft. high, with angled stems, and stalked, ovate leaves, which have coarse angular teeth; the small white flowers are in lateral and umbel-like clusters, and succeeded by globular berries, green at first, but black when ripe; it blooms from July to September, and may usually be found with flowers and ripe fruit upon the same plant. This homely introduced weed is quite common in fields in the older parts of the country, and often met with in the shady places around dwellings and in waste grounds near villages. It is so readily exterminated that it can hardly rank as a troublesome weed. The plant has a bad reputation, though the evidence as to its poisonous qualities is very conflicting; it is stated that children have died soon after eating the berries with all the symptoms of narcotic poi-

soning, while on the other hand the berries are said to be used in some countries as food. It is possible that this difference may be due to soil and climate, as the plant varies so much in the color of its berries and other characters that it has been described under some 40 different names. The dried foliage seems to act upon the secretions, and in doses of one or two grains has been used for diseases of the skin. —The alkaloid solania or solanine was first discovered in this plant, but was afterward found in the foliage of other species of *solanum*, including the potato (*S. tuberosum*). A grain of this alkaloid killed a rabbit in six hours. The plant is of a sufficiently suspicious character to make its extermination desirable. —Deadly nightshade is *atropa belladonna*. (See BELLADONNA.) Climbing or woody nightshade, or bittersweet, is *solanum dulcamara*. (See SOLANUM.) Enchanter's nightshade is *Circea lutetiana*, which, though formerly used in the mysteries of witchcraft, is a very innocent plant of the evening primrose family. Three-leaved nightshade is one of the common names for species of the genus *trillium*. (See TRILLIUM.)

NIGRITIA. See SOODAN.

NIHILISM. See SUPPLEMENT.

NIIGATA, a seaport on the W. coast of the main island of Japan, in the province of Echigo, on the S. bank of the Shinano river, opposite Sado island, capital of the *ken* or prefecture of the same name; pop. about 60,000. It is the place of greatest mercantile importance on the W. coast of the main island, but the existence of a long and dangerous bar at the mouth of the river renders it nearly useless for any but junks and vessels of light draught. Inside, the water is 15 or 20 ft. deep. The city is neatly laid out; the streets are levelled, paved with gravel, well drained, cleaned, and lighted with the coal oil obtained in the neighborhood. The river islands are connected with the city by bridges. It has a flourishing inland trade, the excellent roads and waterways approaching the city reaching into the silk districts of Aidzu, and the coal and petroleum deposits of Echigo. A rich overland trade is carried on with Sendai on the E. coast. Junks and steamers ply in the rivers, distributing the exports of rice, coal, coal oil, fish, and silk, and the imports of sugar, wax, &c. It contains a government hospital, national and private banks, and a school of foreign languages. Niigata was founded in the 17th century, and was under the direct government of the shogun. It was opened to foreign commerce by the treaties of 1858, but owing to the bar it cannot be used for that purpose.

NIJMI NOVGOROD. See NIZHNI NOVGOROD.

NIKKO ("Sunny Splendor"), the name of a range of mountains in the province of Shimotsuke, on the main island of Japan, about 100 m. N. of Tokio, famous for its scenery, and for being the burial place of the greatest personage in Japanese history, Tokugawa Iyeyasu, the warrior, lawgiver, and founder of

the last and greatest dynasty of shoguns, which held the military power of Japan from 1603 to 1867. The highest mountain of the range is Nan-Taizan. The sanctity of Nikko dates from A. D. 767, and from the most ancient times it was the seat of one of the many Shinto deities whom the early Buddhists transferred to their pantheon, under the general title of Gongen. It contains a vast number of temples, shrines, pagodas, monuments, and religious edifices of all kinds, and has long been the favorite resort of thousands of pilgrims. The village of Hachiishi lies at the entrance to the holy places. At the decease of Iyeyasu two nobles were commissioned to select a suitable burying place for his body. In 1617 the shrine and many of the surrounding edifices were completed, the corpse deposited, the Buddhist high mass celebrated, and the title of Dai Gongen conferred, whence Iyeyasu is often called Gongen Sama. Iyemitsu, grandson of Iyeyasu, and the third prince of the line, is also buried at Nikko. From an early date the chief priest of Nikko was a prince of the imperial blood. The gifts of vassal daimios and of pious pilgrims have so beautified and sanctified the place as to make it, both as to nature and art, the most attractive in all Japan. Seven miles from the tombs are the lake of Chiuzenji, and the famous waterfall of Kiri-furi (falling mist), which is more than 700 ft. high.

NIKOLAYEV, or *Nicolaiev*, a town of Russia, in the government and 36 m. N. W. of the city of Kherson, near the confluence of the rivers Bog and Ingul; pop. in 1867, 67,972. It occupies a large extent of ground, and is fortified.

seminary. The dockyards are very extensive. The town was founded in 1790, and for a time grew very rapidly, but its commercial prosperity was hindered by its proximity to Kherson. After the fall of Sebastopol it was made one of the principal stations of the Russian navy. In 1867 474 vessels, of 58,255 tons, cleared from the port, with cargoes valued at \$5,500,000.

NIKOLSBURG, a town of Austria, in the province of Moravia, 45 m. N. by E. of Vienna; pop. in 1869, 8,758. It has a gymnasium conducted by the Piarists, a Jewish school, an industrial school, a beautiful Gothic collegiate church, and two synagogues. In the centre of the town, on a rock, is the castle of Prince Dietrichstein, with a library of more than 20,000 volumes. Near it is the village of Voitelbrunn, with a sulphur bath. In December, 1805, negotiations were conducted here which led to the peace of Presburg. On July 26, 1866, a truce and preliminary peace was concluded here between Austria and Prussia, and on July 28 a truce between Prussia and Bavaria.

NILE (Gr. *Νεῖλος*; Lat. *Nilus*; Arab. *En-Nîl*), the principal river of Africa, and one of the largest and most famous rivers of the world. The name is of Semitic origin, and is applied to rivers that periodically overflow and irrigate their banks. Near the city of Khartoom, in the Egyptian province of Soudan or Sennaar, in lat. 15° 36' N., lon. 32° 38' E., two great rivers unite, the larger of which comes from the southwest, and is called in Arabic Bahr el-Abiad or White river, and in English is commonly known as the White Nile. This appellation is derived from the color given to

its waters by the clay with which they are saturated. The other river flows from the southeast, and is called in Arabic Bahr el-Azrek, Blue river, and in English is commonly termed the Blue Nile. It is the Astapus of ancient geography, and was long regarded as the true Nile. It is formed by the junction of the Abai and Dedhesa rivers, about lat. 10° 30' N.; and the question which of these is the main stream of the Blue Nile, and which the tributary, has been a subject of controversy among geographers. The weight of opinion is in favor of regarding the Dedhesa as the principal



Nikolayev.

The streets are of enormous width; the houses are generally of one story, and have large gardens attached to them; and there is a fine boulevard planted with trees along the Bog. The principal public edifices are the cathedral, town hall, observatory, admiralty, navy barracks, naval hospital, and hydrographical

river, which if this view is correct rises in the Galla country S. of Abyssinia. On the other hand, the sources of the Abai were visited, as being those of the Nile, in the 16th century by the Portuguese missionary Paez, and in 1770 by the celebrated Scottish traveller James Bruce, who traced them to a point

S. of the Tzana or Dembea lake in Abyssinia, in lat. $10^{\circ} 58' N.$, lon. $36^{\circ} 50' E.$, at an altitude of 6,000 ft. above the sea level. Thence the river flows about 80 m. N. W. into the lake itself on its W. side, through it, and out again on its S. E. side. Its current is so rapid that it scarcely mingles its waters with those of the lake. Flowing southward in many cataracts, it winds around the mountainous region of Gojam till by a bend to the northwest it returns to within about 70 m. of its source. While forming this remarkable curve, which makes Gojam a peninsula, the Abai receives numerous streams from the mountains of that peninsula. The total length of the Blue Nile, measured from the sources of the Abai, is supposed to be about 800 m. The river is navigable as far as the district of Fazogle, between the 11th and 12th parallels of latitude, about 1,500 m. from the Mediterranean.—The superior magnitude of the Bahr el-Abiad unquestionably entitles it to be considered the Nile proper; and a correct determination of the sources of this river has justly been regarded as the greatest geographical problem of modern times. It has been at least approximately solved by the discovery of two great lakes lying side by side directly under the equator, and known respectively as the Victoria N'yanza and the Albert N'yanza. The first of these equatorial fresh-water basins was discovered on July 30, 1858, by Capt. J. H. Speke of the British Indian army, who in 1862 explored its western and northern margin, in company with Capt. (now Col.) J. W. Grant. According to his observations, it is 3,308 ft. above the sea level, and extends from lat. $2^{\circ} 24' S.$ to $0^{\circ} 21' N.$, a distance of nearly 200 m., with its westernmost shore in about lon. $31^{\circ} 30' E.$, although by far the largest portion of the lake lies E. of the 32d meridian. The measurements taken on his first journey, however, showed an elevation of 3,740 ft. above the ocean. From these observations those of Baker, who visited the Victoria Nile in 1864, differ materially. (See N'YANZA.) The width of the lake is unknown. Its outlet, the Somerset river or Victoria Nile, supposed by Speke to be the Bahr el-Abiad itself, flows northward and westward into the Albert N'yanza, in lat. $2^{\circ} 16' N.$, on the E. shore of that lake, about 30 m. S. of its N. E. extremity. On March 14, 1864, Mr. (now Sir) Samuel Baker discovered this second great lake, the Albert N'yanza, whose outlet is the White Nile of Egypt, of which the lake had hitherto been supposed from native report to be merely an extensive but sluggish backwater. The most southerly point which he visited on its E. shore is probably not more than 100 m. N. W. of the Victoria N'yanza. The Albert N'yanza is 2,720 ft. above the ocean, according to Baker's corrected observations. The width of the northern portion is estimated at 60 m.; it narrows to 17 m. near the exit of the Nile, which is not far from lat. $2^{\circ} 45' N.$, lon. $31^{\circ} 30' E.$ From this

point the lake extends some distance N. W., but how far is not known. The only knowledge of its prolongation southward which we possess is derived from native accounts, which represent it as extending to between lat. 1° and $2^{\circ} S.$, where it is said to bend W. Its shores so far as known are for the most part rocky and mountainous. The existence of these lakes confirms to some extent the notions of the geographer Claudius Ptolemy, who in the 2d century of our era stated the sources of the Nile to be in two lakes lying N. of a snowy range which he calls the mountains of the Moon, and which he describes as extending for 10° of longitude along the parallel of lat. $12^{\circ} 30' S.$ From the snows of these mountains were principally derived the waters of the two lakes, which were due N. of the mountains, the western lake in lat. 6° and the eastern in $7^{\circ} S.$, with a distance between them of 8° of longitude. Owing to the imperfection of astronomical science in his day, his latitudes and longitudes are incorrectly given. Notwithstanding the discovery, however, that from the Albert N'yanza comes the Nile proper, and that the Somerset river, flowing from the Victoria N'yanza into this more northern lake, must be regarded as at least an important tributary, if not the upper course of the veritable Nile, the ultimate sources of the great river still remain undetermined. There is every indication that they lie S. of the two great equatorial lakes, and the probability that a channel exists between one of these lakes and Lake Tanganyika was long ago suggested. The altitude of Tanganyika above the level of the sea is 1,844 ft. according to Burton and Speke, 2,586 ft. according to Livingstone, and 2,711.2 ft. as measured by Lieut. L. V. Cameron of the British navy, in 1874. The largest of these results is not equal to the elevation of the Albert N'yanza, itself far below the level of the Victoria lake; so that if we assume as correct the maximum altitude obtained for Lake Tanganyika, it is still impossible that its waters should flow into the Albert N'yanza, unless Baker's measurement of the height of that lake was erroneous. Under the belief, however, that an outlet existed, forming such a communication, Livingstone, accompanied by Mr. H. M. Stanley, explored the northern end of Tanganyika in 1871. Contrary to previous supposition, the Lusizé or Rusizi river, at this extremity of the lake, proved to be an affluent, and the travellers were unable to find any outflow whatever to the north; the other streams of the region also flowed into the lake, none of them out of it. The weight of opinion among European geographers is opposed to the conclusion reached by Livingstone, that the vast lacustrine river system W. of the Tanganyika lake, which he discovered during his final sojourn in Africa, is connected with the basin of the Nile. The Lualaba, which appears to be the principal stream of this vast network, rises directly S. of Lake Tanganyika,

under the name of the Chamabeze, and flows thence S. W. into Lake Bangweolo or Bemba, which, according to Livingstone's uncorrected map, extends 150 m. from E. to W. and 80 m. from N. to S., at a height of 3,688 ft. above the sea, between lat. $10^{\circ} 55'$ and 12° S., and lon. $28^{\circ} 15'$ and $30^{\circ} 35'$ E. Emerging from the N. W. corner of this lake, with a width of four miles, as the Luapula, the river follows a circuitous course, the general direction of which is exactly N., until it falls into the Moero Okata, "the great lake Moero," which is bisected by the 9th parallel of S. latitude, and lies between lon. 28° and 29° E. Livingstone describes this lake as about 50 m. long from N. to S., with a width ranging from 12 to 40 m., and its altitude is marked on his map as 3,000 ft. From its northern termination issues the Lualaba under that name, distinguished by him however as Webb's Lualaba, flowing northward to the 7th degree of S. latitude, which it follows toward the west from the 28th to the 26th meridian, through Lake Kamolondo, a sheet of water supposed to be not less than 150 m. long. After leaving this lake the direction of the river is again northerly, and at the lowest point in its course yet reached, just S. of the 4th degree of S. latitude, the width of the stream is 3,000 yards. Beyond this, according to native information, it pours into a reedy lake which stretches nearly up to the equator. It is apparent from what has been stated that the Lualaba occupies a valley trending northward, situated W. of the Tanganyika lake and generally parallel to it. Still further W. is the valley of the Lufira, a river which is believed to fall into Lake Kamolondo on its S. W. shore. Beyond this lies the valley of the Loeki or Lomame, another great river, which traverses a lake lying W. of Kamolondo, known to the natives as Chebungo, but named Lake Lincoln by Livingstone. It is conjectured that this river, which he called Young's Lualaba, joins the Lualaba proper, already described, at some point between Kamolondo and the equator. The elevated plateau, from which proceeds this entire system of 200,000 sq. m. of drainage, is described by Livingstone as extending along the 12th degree of S. latitude about 700 m. E. and W., with an altitude which he estimates at 6,000 ft. A doubt whether its waters might not possibly find their way into the Congo instead of into the Nile is recorded in his last journals, under the date of June 24, 1872. The improbability that they belong to the Nile basin has been strengthened by Schweinfurth's discovery in 1870 of the westward-flowing river Welle, which he crossed in about lat. $3^{\circ} 30'$ N., S. of the mountains among which rise the principal known tributaries of the Bahr el-Ghazal, the great western arm of the Nile. He learned that the source of the Welle was in the mountainous country W. of the Albert lake. The course of this river tends to confirm the view that the watershed of the Lualaba system is wholly western, and cannot

therefore be connected with the Nile; but further explorations are necessary to a satisfactory determination of the question.—The White Nile emerges from the Albert N'yanza into a valley of green reeds, from 4 to 6 m. wide, bordered on the west by the range of mountains which bounds the W. shore of the lake. Unbroken by a single cataract, it flows with a scarcely perceptible current, and in some places several miles in width, northerly to Afuddo, 2,116 ft. above the sea, in lat. $3^{\circ} 32'$ N., where there is a fall of from 30 to 40 ft. A few miles further down it receives from the east its first important affluent, the Asua river, with a channel over 100 yards wide and 15 ft. deep during the rains, but without water in the dry season. The country on the west continues mountainous as far as lat. 4° N., where the Nile is about 650 ft. broad and from 5 to 8 ft. deep. At lat. $4^{\circ} 37'$ the river descends a series of rapids to Gondokoro, about 20 m. below, a small ivory-trading station on the E. bank, celebrated as a starting point of exploration. The altitude above the ocean here is 1,559 ft. The Nile now leaves the hill region and passes into a well wooded and thickly populated country, the level of which is only about 4 ft. above the river. Beyond lat. 5° the river makes a great bend westward through nearly three degrees of longitude, returning to the meridian of Gondokoro before reaching lat. 10° . After passing lat. 6° the character of the country changes. The forests disappear, and the shores become marshy and covered with tall grass. The course of the river is exceedingly tortuous and its current sluggish, not exceeding 3 m. an hour, while the width of clear water is about 120 yards. Two small tributaries from the west join the Nile in this part of its course, but are full only in the wet season. In lat. $9^{\circ} 16'$ is the mouth of its greatest western affluent, the Bahr el-Ghazal. Here the waters expand into a shallow lacustrine formation known on the maps as Lake No, but more properly designated Mogren el-Bohoor, the mouth of the streams. It is described by Baker as having the appearance of a lake 3 m. long by 1 m. wide, varying according to the seasons; but it is divided into a perfect labyrinth of channels, and is so obstructed by floating vegetation as frequently to render navigation utterly impracticable. The navigable portion of the Bahr el-Ghazal, or Gazelle river, properly so called, does not extend more than 140 m. from the Nile, and terminates in an island-studded lake-like basin called the Meshera or Kyt, situated in about lat. $8^{\circ} 35'$ N., lon. $29^{\circ} 15'$ E. This basin presents the aspect of an extensive backwater. The eastward current is extremely languid, and indeed is frequently only perceptible in the upper course of the river, the depth of which varies from 8 to 14 ft. Sixteen miles below the Meshera the Gazelle receives the Bahr el-Dyoor from the south, and still further down its volume is increased by the waters of the Bahr el-Arab,

which flows almost directly from the west. This tributary, which Schweinfurth believes to be the main stream, is said to be unfordable at a distance of 300 m. above its mouth, while the Dyoor and all the S. W. affluents of the Gazelle are known to be much smaller. The drainage area of the Bahr el-Ghazal and its tributaries is estimated by Schweinfurth at 150,000 sq. m.; there are great discrepancies, however, between the views of different explorers of the Nile, as to the importance of this western branch and the actual quantity of water which it supplies to the main stream. It is about 1,000 ft. wide at the mouth of the Bahr el-Arab. A few miles N. of its confluence with the Gazelle, the Nile receives from the south the Bahr Giraffe, a river about 70 yards wide and 19 ft. deep in the dry season, once believed to be an independent tributary stream, but now known to be an eastern offset of the Bahr el-Abiad, which it leaves in the Aliab country not far from lat. 6° N., and rejoins at this point, lat. 9° 25'. Although densely clogged with water plants, it has sometimes afforded a navigable route up the Nile for ivory merchants, when that by the main channel has been impassable by reason of the grass barrier. The junction of the Sobat is 38 m. below, being about 750 m. from Gondokoro. Baker regards this as probably the most powerful affluent of the Nile. It is 650 ft. broad, and brings down a vast volume of yellow water, in a swift and strong current from 26 to 28 ft. in depth. It comes from the southeast, and is supposed to rise in the Kaffa country S. of Abyssinia. Little is known of its upper course, which has never been explored, but the earthy matter which it holds in solution indicates a mountain origin. The distance from the mouth of the Sobat to Khartoom is 684 m. The river increases in width from 1,500 yards to 2 m., flowing between the lands of the Dinkas on the east and those of the Shillooks on the west. The marshy banks and floating islands of aquatic plants are left behind, and the Nile emerges into a perfectly level region, where arboreal vegetation is confined mainly to the margin of the river, and consists principally of mimosas. At rare intervals the monotonous character of the landscape is diversified by an isolated elevation, and the right bank of the river, through several degrees of latitude before reaching Khartoom, is bordered by a succession of sand banks 30 ft. high. Immense numbers of cattle are pastured on the light but rich soil of the shores, and innumerable ducks and geese haunt the stream.—From Khartoom the united waters of the White Nile and Blue Nile flow northward about 50 m., and then make a sudden bend to the east between a thick cluster of islands. At this point there is a rapid extending half way across the river, known as the sixth cataract of the Nile, it being the last which is met in ascending from the sea till the traveller reaches on the White Nile the rapids

above Gondokoro, and on the Blue Nile the cataracts by which the river descends from the Abyssinian highlands. Here the Nile is very narrow, being compressed between high hills of naked red sandstone rock. From the sixth cataract it flows in a N. E. direction to Shendy, and is studded with islands covered with a luxuriant growth of palms, mimosas, acacias, sycamores, and other trees. The banks are high and steep and covered with bushes and rank grass. Reefs of black rock make the navigation intricate and dangerous. The country is thickly populated. Shendy is a long straggling town of mud huts, with about 10,000 inhabitants. Thence the river runs N. E. past the ruins of Meroë through a well cultivated region. In lat. 17° 37', 160 m. below Khartoom, the Abyssinian river Atbara, called also Bahr el-Aswat or Black river from the quantity of black earth brought down by it during the rains, enters the Nile on the right bank, flowing from the southeast. It is the ancient Astaboras. The peninsula between it and the Blue Nile was the ancient kingdom of Meroë, which was called an island by the Greek and Roman writers, who were accustomed to give this name to the irregular spaces included between confluent rivers. The Atbara is the last affluent of the Nile, which for the rest of its course presents the unparalleled phenomenon of a river flowing 1,500 m. without a tributary. It contributes to the Nile the largest part of the slimy mud which fertilizes Egypt. The Atbara is formed about lat. 14° 15' by two great streams, the larger of which bears the name of Tacazze, and rises in the table land of Abyssinia; the other, which is considered the direct upper course of the Atbara, has its sources in the highlands N. and N. W. of Lake Tzana or Dembea. From its confluence with the Atbara the Nile flows through Nubia for 700 m. to Syene or Asswan on the frontiers of Egypt. It passes over a series of rapids and cataracts, all formed by granite or kindred rocks. For 120 m. from the Atbara it runs nearly N. through the province of Berber. A strip of arable land about 2 m. in breadth borders the river; beyond it all is desert, the inundation not extending further. At Abu Hammed, where the river is divided by the large rocky island of Mogrât, it makes a great bend S. W., and runs in that direction about 150 m., enclosing on its left bank a region called the desert of Bahiuda, which was occupied in ancient times by the Nubæ, from whom Nubia derives its name. The navigation in this part is impeded by rapids, and the land susceptible of cultivation is so small in extent that the inhabitants avail themselves of the patches of loamy soil which the river deposits in the rocky hollows. Travellers going down the Nile quit the river at Abu Hammed and cross the desert to Korosko, a march of 250 m., while by the course of the river the distance between the same points is upward of 600 m. The banks of the Nile where it

skirts the desert of Bahiuda on the north are without antiquities; but at Noori on the left bank, below the fourth cataract, are the remains of 35 pyramids, of which about half are in good preservation; they have, however, no sculptures or hieroglyphics, nor are there any ruins which indicate the former existence of a city. Nearly opposite Noori, on the right bank, is Jebel Barkal, a hill of crumbling sandstone 400 ft. high and a mile distant from the river. On the W. side of the hill are 13 pyramids from 35 to 60 ft. high. Here are also the remains of several large Egyptian temples, one of them nearly 500 ft. long. These ruins are supposed to mark the southern limits of the empire of the Pharaohs, and the city to which they belonged was probably Napata, the capital of Tirhakah, the king of the Ethiopians, and also of those sovereigns of Ethiopia who are mentioned in the ancient history of Egypt. A short distance below Jebel Barkal, on the right bank of the river, is the village of Merawe, nearly opposite to which is the point from which travellers up the Nile begin their march across the desert of Bahiuda to Shendy, and thus cut off the great upper bend of the river. After passing Merawe the Nile continues S. W. till it reaches lat. 18° , when it again turns N. In this part of its course it is about half a mile wide. The desert on both sides reaches to the banks, and there is little cultivable land except on the islands. The province of Dongola begins at this point, and extends northward about 175 m. This region is tolerably fertile, the banks of the river being no longer rocky, and the annual inundation diffusing itself over a large extent of land, abounding in fine pastures where excellent horses are bred. A little above the third cataract, in lat. $19^{\circ} 24'$, is the island of Argo, which is 12 m. long, and contains a number of ruins, among them two overthrown colossal statues of gray granite, in Ethiopian costume with Egyptian features. Below the third cataract, near lat. $19^{\circ} 45'$, the Nile makes a bend to the east; and travellers descending the river usually take a straight line through the desert to Saleb on the left bank, where are found the ruins of a temple remarkable for the elegance of its architecture and its imposing and picturesque position on the line which separates the desert from the fertile land. A few miles below, the large island of Say divides the river, which soon after contracts between granite rocks so closely that it is but a few hundred feet in width. The rocks hang over the shore and fill the river with shoals, causing so many eddies, rapids, and shallows, that navigation is practicable only at the time of highest flood, and is even then dangerous. About half way between the island of Say and the second cataract, in lat. $21^{\circ} 27'$, is the village of Semneh on the left bank, where are the remains of a small but interesting temple of the third Thothmes. As the river approaches the second cataract, near the 22d parallel, the porphyritic and granitic

rocks on its banks give place to sandstone. The second cataract, which was called by the ancients the great cataract, is, like all the others, formed by primitive rocks rising through the sandstone, in a succession of islands dividing the stream, which foams and rushes between them, with a roar which may be heard at the distance of more than a mile. It is rather a collection of rapids than a fall. A city once existed here, and the remains of three ancient temples are yet visible. From the second cataract to the frontier of Egypt, a distance of 220 m., there is a multitude of temples, some on the right, some on the left bank of the river, the most remarkable of which are those of Abu Sambul or Ipsambul, on the left bank, two days' journey below the cataract. (See IPSAMBUL.) A few miles lower down, at Ibrim, the ancient Premis, are ruins of the same kind, of the age of Thothmes I. and III., and Rameses II. Just beyond Ibrim the channel of the river is compressed between a range of sandstone hills rising almost perpendicularly, so close to the shore that there is hardly room to pass between their bases and the water. A few miles below, at Derr, the capital of Lower Nubia, the river bends abruptly S. E. and then, near Korosko, again N. All this region abounds in temples of Rameses the Great, Thothmes III. and IV., and Amenophis II. Amada, two hours' sail below Derr and on the opposite bank, has a temple whose sculptures are remarkable for the brightness of their colors, having been preserved by the early Christians, who covered them with mud and mortar to conceal them from their sight; and the traveller proceeding northward passes in rapid succession Wady es-Seboo, the valley of lions or sphinxes; Dakkeh, the ancient Pselchis, the site of a temple of Ergamenes, mentioned by Diodorus as resisting the tyranny of the priests (the deity of which was Hermes Trismegistus, identified with Thoth), the furthest S. point at which any traces of Greek or Roman dominion have been found on monuments; Dendoor, the site of a temple of the age of Augustus; and Kalabshe, the ancient Talmis, situated in lat. $23^{\circ} 30'$, directly under the tropic of Cancer, where is the largest temple in Nubia, which was built in the reign of Augustus, and enlarged by Caligula, Trajan, and Severus. In this part of its course the river flows between mountains on each side rising from the water's edge, and piles of dark sandstone or porphyry rock, sometimes 1,000 ft. in height, where a blade of grass never grew, every notch and jag on their crests, every fissure on their sides, revealed in a pure and crystalline atmosphere. Their hue near at hand is a glaring brown; in the distance an intense violet. On the W. bank they are lower; and the sand of that vast desert, which stretches unbroken to the Atlantic, has heaped itself over their shoulders and poured long drifts and rills even to the water. The arable land is a mere hem, a few yards in breadth, on each bank of the river, supporting

a few scattering date palms, which are the principal dependence of the Nubians. The rise of the Nile during the annual inundation is in some parts of this region as much as 30 ft., but the height of the banks is such that the adjacent land derives but little benefit from the overflow. When the river is low the fields are irrigated by water wheels of clumsy construction. At the boundary between Nubia and Egypt is the island of Philæ, where the Nile is 3,000 ft. broad. The island is about a quarter of a mile long, and is covered with picturesque ruins of temples, almost entirely of the times of the Ptolemies and of the Roman emperors. Immediately below Philæ is the first cataract, the last in descending the river, which extends to Asswan, and to the island of Elephantinê. The ridge of granite by which they are formed crosses the river and extends into the desert on either side. The rocks are much more rugged than those of the second cataract, and rise to the height of 40 ft. There are three principal falls; at the steepest, which is about 30 ft. wide, the descent is about 12 ft. in 100. The entire descent in a space of 5 m. is 80 ft., and the whole constitutes a series of rapids rather than falls, the highest single fall not exceeding 6 ft. The channel has been widened, and may be passed by boats at all seasons. From the quarries on the banks were derived the colossal statues, obelisks, and monoliths which are found throughout Egypt. The island of Elephantinê, in lat. $24^{\circ} 5'$, just opposite Syene, is fertile and covered with verdure. From Asswan to the Mediterranean, a distance of 700 m., the Nile runs down a gentle declivity of about 300 ft. The valley through which it flows till it reaches the apex of the delta varies in breadth, with an average of 7 m., the greatest width being 11 m. A short distance below Asswan begins a district of sandstone, which extends nearly to lat. 25° . This part of the valley is narrow and barren. Near lat. 25° is Edfoo, the ancient Apollinopolis Magna, which stands on the left bank, and contains two famous temples built by the Ptolemies, the largest of which is the best preserved of all the edifices of the kind in Egypt. At Esne, the ancient Latopolis, on the left bank, 30 m. N. W., the valley of the river expands to the width of nearly 5 m. Here are the remains of a magnificent temple built by the Roman emperors. Still lower down the rocks of Jebelain or the "two mountains" approach so near each other on opposite sides, that the river occupies nearly the whole valley. Here the sandstone disappears, and is succeeded by limestone hills, which border the river till it reaches the delta. There is from this point a wider interval of fertile land, especially on the W. side. Fifty miles below Edfoo, in lat. $25^{\circ} 38'$, stand the magnificent ruins of Thebes, the ancient capital of Upper Egypt. Here the river is $1\frac{1}{4}$ m. wide, and is divided by islands. On the right bank are the modern villages of Luxor and Karnak, on the left Medi-

net Abu and Goorna. From Thebes the traveller descending the river passes numerous ruins, at Medamot, at Koos or Apollinopolis Parva, and at Coptos on the right bank; and on the left bank, 38 m. below Thebes, reaches Denderah, the ancient Tentyra, where are seen the majestic remains of the temple dedicated to Athor or Aphrodite, or, as some believe, to Isis, one of the most impressive of Egyptian monuments. Not far below this the river bends W., and at How or Diospolis Parva on the left bank begins the canal or ancient branch of the Nile, called the Bahr Yusuf or river of Joseph, which flows between the river and the Libyan hills to the entrance of the Fayoom. Not far distant is Abydos or This, one of the most ancient cities of Egypt, the birthplace of Menes, the first of the Pharaohs. Beyond this are Chemmis or Panopolis on the E. bank; Si-oot, the ancient Lycopolis, on the W. bank; and a little lower down, on both banks, the grottoes of Manfaloot, the sepulchres of embalmed dogs, cats, and crocodiles. Still lower are the ruins of Hermopolis Magna on the W. side, and on the E. side the remains of Antinoë, built by Hadrian in the Roman style. North of Antinoë, on the E. bank, are the famous grottoes of Beni-Hassan, about 30 in number, excavated by the kings of the 12th dynasty, containing paintings of scenes in the civil and domestic life of the ancient Egyptians, from which modern Egyptologists have derived most of the existing knowledge of the manners and customs of that people. From this point the course of the river presents no remarkable feature till it reaches Beni-Sooef in lat. $29^{\circ} 9'$, where the Libyan chain of hills begins to retire from the river, bends N. W., and again returning toward the river encloses the province of Fayoom, in which were the lake of Mæris, the labyrinth, and the city of Crocodilopolis. The next objects of interest in descending the stream are the pyramids of Dashoor and Sakkara, and finally the great pyramids of Gizeh, the royal sepulchres of ancient Memphis. The site of this ancient city is marked by the mounds of Mitrahenny. A few miles lower down, on the E. bank, is Boolak, the port of Cairo, which was originally on an island. A little above Cairo the double chain of hills between which the Nile has so long flowed terminates, those on the E. side turning off toward the head of the Red sea, and those on the opposite side returning toward the northwest. From this point the Nile expands, and its current slackens, and soon begins to flow sluggishly in separate branches, though at Rosetta, only 6 m. from the sea, the water is perfectly fresh except after long prevalence of northerly winds. Twelve miles below Cairo is the apex of the delta, the point of separation, which in ancient times was 6 or 7 m. higher up. Thence the delta extends 90 m. seaward, a broad and perfectly level alluvial plain, without a hill, rock, or natural elevation of any kind. Anciently the Nile traversed the delta by seven

branches, of which only three appear to have been of much size, the Pelusiatic or eastern arm, the Canopic or western, and the Sebennytic or middle. The river now enters the Mediterranean by two outlets, the Rosetta branch on the west and the Damietta branch on the east, with their mouths in lat. $31^{\circ} 36'$ N., separated from each other by 95 m. of seacoast. The Pelusiatic branch is now dry. On the E. side of it, not far from the apex of the delta, was Heliopolis, the On of Scripture, of whose ruins only an obelisk remains. Forty miles lower down was Bubastis; and still lower, near the sea, though its remains are now several miles inland, was Pelusium, from which the arm derived its name. The ancient Sebennytic branch had its mouth where the lake of Boorlos now lies. It has been partially renewed in a free wide canal, which starts midway between the two modern branches, and continues as far as Tanta, about half way between Cairo and the sea. The Canopic branch is represented by the first part of the present Rosetta branch as far as lat. 31° , whence it turned to the west and entered the sea near the bay of Aboukir. The W. or Rosetta branch is the usual channel of communication between Alexandria and Cairo, and is navigated by small steamers at regular intervals; it is 1,800 ft. broad, and has in the dry season a depth of about 5 ft. The Damietta branch is 900 ft. wide, and its depth when the river is lowest is about 8 ft.—In the ordinary state of its waters the Nile has not depth sufficient for vessels of more than 60 tons burden, but during the height of the inundation the depth of water is 40 ft., and large vessels can ascend to Cairo. The river begins to rise as early as April in its upper branches, but not until the latter part of June in Egypt, where it reaches its greatest height between Sept. 20 and 30, when it is usually at Cairo 24 ft. above the low-water level, and at Thebes 36 ft. About the middle of October it begins to fall, and in Egypt is at the lowest about the middle of May. The rise sometimes reaches 30 ft., and the overflow then does great damage; on the other hand, when it falls short of 18 ft., the harvests fail, and Egypt experiences a famine. Of the 66 inundations between 1735 and 1801, 11 were very high, 30 good, 16 feeble, and 9 insufficient. The water of the river is charged with mud, which it deposits over the cultivated land of Egypt to an average depth of not more than the 20th part of an inch each year. Notwithstanding its turbidness, the water is sweet and wholesome, and is freely drunk by the people, among whom the saying is proverbial that he who has drunk of the Nile will always long to return and drink of it again.—On the island of Rhoddah, near Cairo, is the celebrated nilometer for indicating the height of the Nile during the annual inundation. It consists of a square well or chamber, in the centre of which is a graduated pillar, divided into cubits of about 22 in. each. A nilometer existed at Memphis

in the times of the Pharaohs, and during the reigns of the Ptolemies there was one at Ili-thyia, and another at Elephantiné in the reigns of the early Roman emperors. That at Rhoddah is attributed to the caliph Amin, who reigned from 809 to 833. During the inundation four criers proclaim every morning in the streets of Cairo the height to which the water has risen. When it has reached 18 cubits the canals are opened and it is allowed to flow over the land. In 1847 the French engineer Linant commenced the construction of a *barrage* or great dam, just below the apex of the delta, whereby it was intended so to regulate the flow of water as to produce two inundations in a year; but after 62 beautiful arches had been thrown across the Rosetta branch, the work was abandoned in consequence of the practical difficulties which were encountered.—As the extent of the Nile basin is not definitely known, no accurate estimate of its area can be given; but it may safely be stated as at least 500,000 sq. m. Its approximate length, throughout all its windings, from the limit of steam navigation above Gondokoro, in lat. $4^{\circ} 37'$ N., is 3,000 m., which gives an average descent in the river of 9 in. per mile. The average fall per mile from Asswan to Cairo, 555 m., is 6.4 in. The additional length of the river between the point we have mentioned and its exit from the Albert N'yanza can scarcely be less than 200 m. According to Lyell, not only the fertility of the alluvial plain above Cairo, but the very existence of the delta below that capital, are due to the power possessed by the Nile of transporting mud from the interior of Africa and depositing it on its inundated plains. The following is the composition of the Nile mud, which is generally found unstratified: silica, 42.50; alumina, 24.25; carbonate of lime, 3.85; peroxide of iron, 13.65; magnesia, 1.05; carbonate of magnesia, 1.20; humic acid, 2.80; water, 10.70. The investigations, conducted under the auspices of the royal society of England, for the purpose of ascertaining the rate of accumulation, indicate a mean increase of $3\frac{1}{2}$ in. in a century; but this result requires verification, especially as there are geological reasons for believing that a slow subsidence of the land in Egypt has taken place within the historic period.—The ibis, the hippopotamus, and the crocodile are characteristic animals of the Nile fauna, all frequenting the upper portion of the river, though formerly common in the northern latitudes. The lotus and the papyrus are equally distinctive representatives of the flora. The Nile abounds with fish, among which are large eels, white trout, and a large species of salmon.—The course of the White Nile above its junction with the Blue Nile at Khartoom was first explored in 1827 by M. Linant, who ascended the stream as far as El-Ais in lat. $13^{\circ} 23'$ N. A few years afterward Mehemet Ali, pasha of Egypt, determined to have the river explored to its sources. Accordingly, between 1839 and 1842, three expedi-

tions were fitted out for that purpose; the first ascended to lat. 6° 30' N., discovering on its passage the mouth of the Sobat, Lake No, and the Bahr el-Ghazal; the second reached lat. 4° 42' N.; and the third went not quite so far. In November, 1849, Dr. Knoblecher, a Roman Catholic missionary at Khartoom, accompanied the annual trading expedition sent up the Nile by the Egyptian authorities, and ascended the river to lat. 4° 10' N., then further than any other explorer had ever gone. The Bahr el-Ghazal was explored by Petherick in 1853 and the five following years, and subsequently in 1862 and 1863. In the latter year, Miss Tinné, the Dutch traveller, visited the southwestern affluents of the river, and lost her life in this region in 1869. She was succeeded in the same field, in 1869-'71, by Schweinfurth, whose acquirements as a botanist have given exceptional value to his work. The explorations of Speke and Grant, Baker, and Livingstone have already been mentioned. A short time prior to the first journey of Baker, however, Miani, the Italian traveller, advanced the limit of exploration from the north to a point considerably beyond Gondokoro, in the neighborhood of Afuddo, lat. 3° 32' N. Our knowledge of the White Nile has been largely increased by the recent military expedition sent out by the khedive for the suppression of the slave trade (1871-'3) under the command of Sir Samuel Baker.—The following are the more important works of recent date relating to the exploration of the Nile: Petherick's "Travels in Central Africa" (1859); Speke's "Journal of the Discovery of the Source of the Nile" (1863); Baker's "Albert N'yanza" (1866), "The Nile Tributaries of Abyssinia" (1867), and "Ismaïlia" (1874); Schweinfurth's "The Heart of Africa" (2 vols., 1874); and "The Last Journals of David Livingstone" (2 vols., 1874).

NILES, a city of Berrien co., Michigan, on the E. bank of the St. Joseph river, here crossed by an iron bridge, and on the Michigan Central railroad, 105 m. S. W. of Lansing and 165 m. W. S. W. of Detroit; pop. in 1874, 4,592. The site is diversified, and the surrounding country is rich in agricultural products. There are several handsome business blocks, and the chief street is well built up with brick structures. The business houses carry on a large trade. The river affords good water power, which is controlled by the Niles manufacturing company. There are two paper mills, several large founderies and machine shops, a national bank, several union schools, two weekly newspapers, a monthly periodical, and six churches. Niles was settled in 1828, and incorporated as a village in 1838.

NILES, Hezekiah, an American journalist, born in Chester co., Pa., Oct. 10, 1777, died in Wilmington, Del., April 2, 1839. He learned the trade of a printer, and about 1800 was one of a publishing firm in Wilmington; afterward he contributed to a periodical, and for six years edited a daily paper in Baltimore. He is chief-

ly known as the founder in 1811 of "Niles's Register," a weekly journal published at Baltimore, of which he was the editor till August, 1836. The "Register" was republished by him in 32 volumes, extending from 1812 to 1827, and was continued by his son W. O. Niles and others till June 27, 1849, making 76 volumes in all. He also compiled "Principles and Acts of the Revolution" (1822).

NILES, Nathaniel, an American inventor, born in South Kingston, R. I., April 3, 1741, died at West Fairlee, Vt., Oct. 31, 1828. He graduated at Princeton in 1766, studied medicine and law, and afterward theology, and was licensed to preach. He was never ordained, but continued to preach occasionally during his whole life. Becoming a resident of Norwich, Conn., he invented a process of making wire from bar iron by water power, and connected it with a wool-card manufactory. After the revolution he removed to Orange co., Vt., and filled subsequently several public offices in that state, being speaker of the house of representatives in 1784, judge of the supreme court for several years, a representative in congress from 1791 to 1795, one of the censors for the revision of the state constitution, and six times presidential elector. He published several discourses and sermons, and wrote a "History of the Indian Wars," published in the "Massachusetts Historical Collections."

NILCHAU. See ANTELOPE.

NILSSON, Christine (Mme. ROUZAUD), a Swedish vocalist, born at Hussaby, near Wexiö, Aug. 3, 1843. Her father, though only a peasant, was a violinist, and had charge of the music at the village church. He taught his son Carl the violin, and Christine would pick out for herself on the instrument the tunes that she heard her brother play. Her proficiency became so great that the neighbors came to listen and admire, and finally Carl took her with him to the fairs at the neighboring market towns. At one of these her playing and singing attracted the attention of Thorerhjelm, a magistrate of Ljunby, who offered to provide for her musical education. The offer was accepted, and Mlle. Valerius, afterward baroness of Lenhusen, became her first instructor. She was subsequently sent to Stockholm and placed under the tuition of Franz Berwald. From Stockholm she went to Paris and studied assiduously under Wartel for three years, making her début in October, 1864, at the Théâtre Lyrique in Verdi's *Traviata*. At this theatre she also appeared in *Don Giovanni* and in the character of Astarte in Mozart's "Magic Flute." In June, 1867, she appeared in London in *Traviata*, singing later the part of Marguerite in Gounod's *Faust*. In March, 1868, she made her appearance at the Grand Opéra in Paris as Ophelia in Ambrose Thomas's *Hamlet*. Later in that year, on the occasion of her second visit to England, she took part in the Handel commemorative festival at the crystal palace. Her first appearance in America was

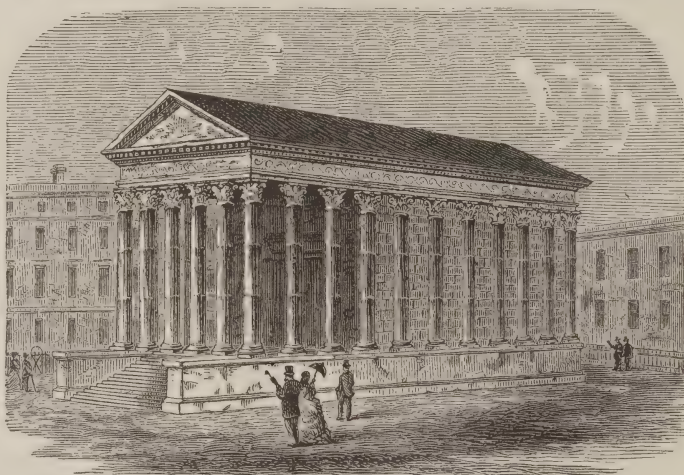
made in September, 1870. During the ensuing winter she sang only in concerts, but in the autumn of 1871 appeared in opera, one of her chief rôles being that of Mignon in Thomas's opera of that name. In July, 1872, she was married in Westminster abbey, London, to Auguste Rouzard, a merchant of Paris, and during the succeeding winter sang with immense success in St. Petersburg. In the autumn of 1873 she returned to the United States, and appeared in Wagner's *Lohengrin* during the winter of 1873-'4. The remarkable purity of her voice, its perfect evenness, its great range and flexibility, combined with her talent as an actress, have placed Nilsson among the foremost singers of her day. She is equally great in tragic as in comic opera, and her position as an oratorio singer is scarcely less distinguished than as a prima donna.

NILSSON, Sven, a Swedish naturalist, born near Landskrona, March 8, 1787. He took his doctor's degree at Lund in 1811, and became professor of zoölogy and president of the zoölogical museum, of which he was the principal founder. From 1828 to 1831 he directed a similar institution in Stockholm, and subsequently resumed his functions at Lund until 1859, when he returned to Stockholm. His principal works are: *Ornithologia Suecica* (2 vols., Copenhagen, 1817-'21); *Skandinavisk Fauna* (10 vols., 1820-'53); and *Skandinaviska nordens urinvånare*, or "The Primitive Inhabitants of Northern Scandinavia" (4 vols., 1838-'43), his most renowned publication, consisting of the "Stone Age" (2d ed., 1866), and the "Bronze Age" (2d ed., 1862-'6).

NIMEGUEN, Nimwegen, or *Nijmegen* (anc. *Noviomagus*), a fortified frontier town of the Netherlands, in Gelderland, on the left bank of the Waal, 10 m. S. by W. of Arnhem and 13 m. N. W. of Cleves, Prussia; pop. in 1872, 22,785. It is built on several hills, on which in ancient times the Romans had formed a camp to guard their Batavian possessions against the Germans. The town is well built, though the streets are narrow. The most remarkable public building is the town hall, containing a few Roman antiquities, the swords of Egmont and Horn, statues of German emperors, and portraits of the ambassadors connected with the treaty of peace signed there in 1678, between Spain, France, and Holland, followed in 1679 by that between the two former countries and Germany and Sweden. On the principal hill

(*Hoenderberg*) are the ruins of the castle of Falkenhof, said to have been built by Charlemagne; and not far from it is the fine café and promenade of the Belvedere, a lofty structure, originally built under the direction of the duke of Alva. The harbor is protected by a wall from the floods and floating ice of the river. There are numerous breweries and flour mills, and manufactories of hardware, stoves, fire engines, cabinet work, painted glass, hats, and gold and silver work; and there is a brisk trade in corn and wine.—Nimeguen was formerly a Hanse town. After joining in 1579 the Utrecht league of the United Provinces of the Netherlands, it was taken by the Spaniards in 1585, and recovered by Maurice of Orange in 1591. In 1672 it was taken by Turenne; but in 1702 it resisted another attack of the French.

NÎMES, or *Nîmes* (anc. *Nemausus*), a city of France, in Languedoc, capital of the department of Gard, 27 m. N. E. of Montpellier and 62 m. N. W. of Marseilles; pop. in 1872, 62,394. The city proper is small and irregularly laid out, with narrow streets and ill-built houses; but its three suburbs, one of which, called the Cours Neuf, is larger than the city itself, present a finer aspect, having wide, straight avenues, fine public walks, and handsome buildings. No other town in France can compare with Nîmes for its ancient Roman edifices. The *maison carrée*, so called from its rectangular form, is a beautiful Corinthian temple nearly in the centre of the city. It suffered greatly during the middle ages, but



Maison Carrée, Nîmes

since 1789 has been restored. In 1823 it was converted into a museum of paintings and antiquities, called the *musée Marie Thérèse*. The amphitheatre, or *les arènes*, is one of the most perfect structures of its kind extant. It has from 32 to 35 ranges of seats, and was capable of accommodating from 17,000 to 23,000 spectators. It was used as a fortress by the Visi-

goths and the Saracens, when attacked by the Franks; during the following centuries it was also occupied as a stronghold. About 2,000 persons had established their abode within this



The Amphitheatre of Nîmes.

building, when in 1809 it was cleared by order of the prefect; and in 1858 its restoration was begun. The *tour magne* (*turris magna*) is the remnant of a tower which flanked the ancient walls. The boulevards now occupy the site of the ramparts, but portions of them are still extant in the *porte d'Auguste* and *porte de France*, two Roman gates, the former of which is ornamented with sculptures. To these monuments must be added a ruined *nymphæum*, a fane dedicated to the nymphs, which communicated with a neighboring bath for women, the remains of which have been taken for those of a temple of Diana. The magnificent aqueduct, known as the *pont du Gard*, is in the vicinity of Nîmes. (See *AQUEDUCT*, vol. i., p. 613.) Among the edifices of a later period are the cathedral, begun in the 11th century, but constructed chiefly in the 16th and 17th, occupying the site of a temple of Apollo; the church of St. Paul; the palace of justice; the general hospital; the Hôtel-Dieu, rebuilt in 1830; the public library; the central house of detention, which is the citadel built by Vauban over the remains of the old Fort Rohan erected in 1629 by the Huguenots; and the fine monumental fountain by Pradier, erected in 1851, on the esplanade. In the public garden is still to be seen the fountain that furnished the Roman baths with water. Nîmes is the seat of a bishop, and has a high court, tribunals of primary jurisdiction and commerce, a departmental academy, several learned institutions, a lyceum or college, a normal school, a theological seminary, schools of drawing, chemistry and physics, geometry and mechanics as applied to the arts, a society of medicine, a public library of 50,000 volumes, and a cabinet of natural history. Nîmes employs 10,000 operatives in different departments of industry; and its

trade in wine and spirits amounts to \$1,400,000 a year, and in other articles to more than \$3,000,000. It is the great southern mart for raw and manufactured silk. A *conseil de prud'hommes* and a chamber of commerce watch over the interests of workmen and manufacturers.—Nîmes was occupied by the Romans in 121 B. C. It was already one of the most important cities of Gaul and the capital of the *Volcæ Arecomici*. Augustus, Tiberius, Trajan, Hadrian, Antoninus, and Diocletian contributed to its embellishment. But, pillaged by the Vandals, occupied by the Visigoths from 465 to 507, and then by the Franks, taken by the Saracens, from whom it was wrested by Charles Martel in 737, visited by the Norman

pirates, ill treated by its feudal lords, it dwindled away, until in the 14th century its population scarcely amounted to 400. Francis I. assisted in its restoration. Most of its new inhabitants being Huguenots, it suffered during the religious wars, and was severely treated by Louis XIII. and Louis XIV. It was also involved in bloody conflicts in 1791 and 1815.

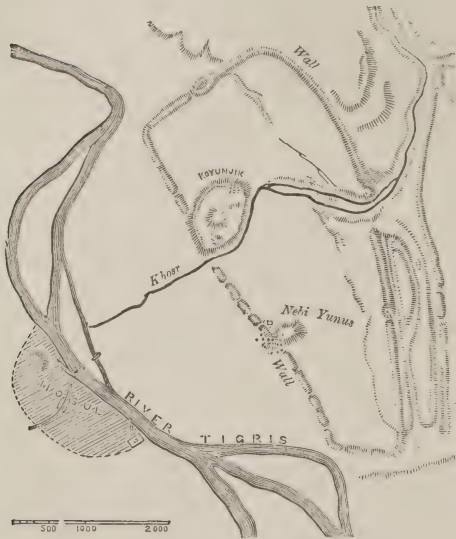
NIMROD, a son of Cush and grandson of Ham, the events of whose life are briefly recorded in the book of Genesis (x. 8–12). It is there said of him, “he began to be a mighty one in the earth;” and it is added, “he was a mighty hunter before the Lord.” He founded an empire in Shinar or Babylonia, the chief towns being Babel, Erech, Accad, and Calneh. “Out of that land he went forth to Assyria,” as the words are properly rendered, “and builded Nineveh,” &c. (verse 2); and this is confirmed by Micah v. 6, where “the land of Nimrod” is a synonyme for “the land of Assyria.” The Nimrod of the Scriptures cannot yet be identified with any personage known to us from inscriptions or from classical writers. The traditional notion of his character connects with it the ideas of violence and insolence. He is supposed to have been the Chesil of Semitic mythology, answering to the Orion of the Greeks, and in Hebrew astronomy to the constellation of that name (Job ix. 9, xxxviii. 31; Amos v. 8; and Isa. xiii. 10, “constellations,” properly Orions); or less probably to the star Canopus in the constellation Argo Navis. He is a representative hero in Arab tradition, which ascribes many great works to him, especially the Birs Nimrud near Babylon, and the mound Nimrud near Nineveh.

NIMROD. See NINEVEH.

NIMRUD, Birs. See BABEL, and BABYLON.

NIMWEGEN. See NIMEGUEN.

NINEVEH (Gr. *Nivoç*; Lat. *Ninus*; Assyrian *Ninua*), an ancient city of Asia, the capital of the Assyrian empire, situated on the E. bank of the Tigris, opposite the present city of Mosul, and about 220 m. N. N. W. of Bagdad. The name appears to be formed from that of an Assyrian deity, Nin, occurring in the names of several Assyrian kings, as in Ninus, the mythical founder of the city. According to Schrader, it signified "abode," corresponding to the Hebrew *naveh*. In the Assyrian inscriptions Nineveh is also supposed to be called the "city of Bel." It is often mentioned in the historical and prophetic books of the Bible; the prophet Jonah warned it to repent; and its overthrow is the principal theme



Plan of the Site of Nineveh.

of the prophecies of Nahum. It is mentioned by Herodotus, Otesias, Strabo, and Diodorus, among classical writers; but its overthrow and ruin was so complete, that Xenophon, though in 401 B. C. he led the 10,000 Greeks over the ground on which it had stood, does not even mention its name; and though 70 years later Alexander fought the great battle of Arbela in the vicinity, none of his historians allude to the ruins of the city. Huge mounds, apparently of mere earth and rubbish, covered its site, the most important of which are known as the mounds of Nimrud, of Koyunjik, of Selamiyeh, of Nebi Yunus or the prophet Jonah (so called from the current belief among the people that the sepulchre of the prophet is on its summit, a tradition which probably originated in the former existence on the spot of a Christian church dedicated to Jonah), of Keremlis, about 15 m. N. E. of Nimrud, and of Khorsabad, 12 m. N. E. of Mosul. The first accurate description and plan of these

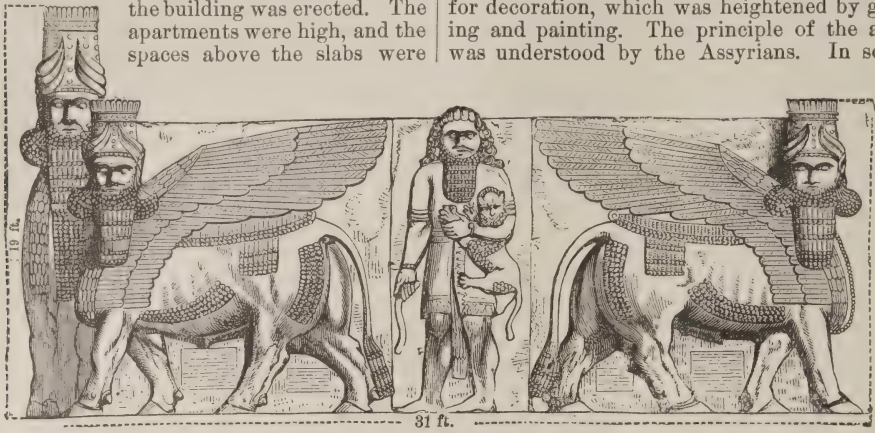
ruins was given by Claudius James Rich, who was for several years the English East India company's political agent at Bagdad. In 1820 he made a survey, which was published after his death. From the neighboring inhabitants he learned that not long before his visit sculptured figures of men and animals had been dug out of one of the mounds, and had been destroyed as idols. He collected a few specimens of pottery and brick inscribed with cuneiform or arrow-headed characters. In 1843 M. Paul Émile Botta, French consul at Mosul, after having examined the mound of Koyunjik without making discoveries of much importance, turned his attention to the mound of Khorsabad, where he soon laid bare the ruins of a magnificent palace which had evidently been destroyed by fire. He found among the remains a series of apartments panelled with slabs of coarse gray alabaster, on which were sculptured in bass relief figures of men and animals, with inscriptions in the cuneiform character. In November, 1845, Austen Henry Layard, an English traveller, began excavations at Nimrud, which were continued till April, 1847, with great success. He discovered immense quantities of sculptures, inscriptions, pottery, and antiquities of all sorts, by means of which more light has been thrown on the history and civilization of the Assyrians than by all the accounts transmitted to us by the writers of antiquity. Excavations with like results were also made in the mounds of Koyunjik and Nebi Yunus. In the latter part of 1849, under the direction and at the expense of the trustees of the British museum, Mr. Layard resumed his explorations, and continued them for about a year. —Before these explorations the ruins which occupied the presumed site of Nineveh seemed to consist of mere shapeless heaps or mounds of earth and rubbish, with little sign of artificial construction except occasional traces of a rude wall of sun-dried bricks. Some of the mounds were so large as to seem natural hills, and some had been chosen as sites for villages, or for small mud forts for defence against marauding Bedouins and Kurds. They are spread over a considerable space, and comprise various separate and distinct groups of ruins, four of which certainly are the remains of fortified enclosures, defended by walls and ditches, towers and ramparts. The ruins opposite Mosul consist of an enclosure formed by a continuous line of mounds, marking the remains of a wall the western face of which is interrupted by the two great mounds of Koyunjik and Nebi Yunus. Eastward is a parallel line of ramparts and moats. The whole enclosure is a quadrangle, the northern side of which is 7,000 ft. long; the western 13,600 ft., forming the chord to the arc of the river, which anciently flowed parallel and close to the wall; the eastern, which is somewhat curved outward, 15,900 ft.; the southern 3,000 ft.; the entire circumference thus being between 7 and 8 m. The general height of this

earthen wall is between 40 and 50 ft. Some remains have been found of stone masonry, which faced the walls to a certain height. The wall occasionally rises above the usual height, marking the remains of a gateway or tower. The mound of Koyunjik is 96 ft. high, nearly 4,000 ft. long from N. to S., and about 1,500 ft. from E. to W. The summit is nearly flat, and was formerly occupied by a small village. The sides are steep and furrowed with occasional watercourses. Koyunjik was once surrounded by a small but deep stream called the Khosr, which now flows around its S. E. side. The mound of Nebi Yunus is about 1,600 ft. from E. to W. and 1,300 ft. from N. to S., but about as high as Koyunjik. Its summit is divided by a depression into two parts. The Turkoman village containing the traditional tomb of Jonah occupies its summit, together with a burial ground held very sacred from its neighborhood. The W. side of the great quadrangle was protected by the Tigris. The E. side was defended in its northern part by the Khosr, which there runs parallel with the wall, and in its southern part by two great moats, which were filled from the Khosr by means of dams that can still be traced. One of these moats was about 200 ft. wide, and cut in the native rock. The outer eastern rampart was of earth, and is 80 ft. high; and some detached towers seemed marked by mounds outside of this outer rampart. The mounds at Nimrud have an arrangement somewhat similar to those opposite Mosul. They are included in a walled square, somewhat irregular, about 7,000 ft. by 6,285, defended on the west and south by the river, on the north and east by moats, and showing traces of 108 towers; the great mound is on the S. W. face of the enclosure, and 2,100 ft. by 1,200, rising in its N. W. corner in a pyramid 140 ft. high. A group of high mounds, which the Arabs call Athur, is at the S. E. corner of the enclosure. The remains at Khorsabad consist of an enclosure about 6,000 ft. square, with traces of gateways and towers, but no ditches, and in the N. W. side a mound in two parts or stages, the lower about 1,350 ft. by 300, and the upper about 650 ft. square and 30 ft. high, while one corner is marked by a pyramid like that at Nimrud, but smaller. An Arab village formerly occupied the summit of the Khorsabad mounds.—In the three mounds of Nimrud, Koyunjik, and Khorsabad the most of the remains of ancient sculptures and buildings have been found. The mound of Nimrud contains the ruins of several distinct edifices, erected at different times, materials for the construction of the latest having been taken from an earlier building. In general plan the ruins consist of a number of halls, chambers, and galleries, panelled with sculptured and inscribed slabs, and opening one into another by doorways, generally formed by pairs of colossal human-headed and winged

bulls or lions. The exterior architecture could not be traced. The pyramidal N. W. corner of the mound rises above the ruins of a basement 165 ft. square, walled to the height of 20 ft. with sun-dried bricks, and faced on the four sides by blocks of stone carefully squared, bevelled, and fitted together. This stone plinth corresponds exactly with the description by Xenophon of the deserted city on the Tigris, which he calls Larissa ("Anabasis," iii. 4), and is surmounted by a superstructure of bricks, as he describes, the burnt bricks being generally inscribed. Above this base a succession of platforms probably rose, each smaller than the one below, and the topmost crowned with a shrine or altar. A vaulted gallery, 100 ft. long, 6 broad, and 12 high, crossed the summit of the mound at the level of the top of the stone plinth. This building is identified with the tower described by Xenophon at Larissa. Its builder also erected in the centre of the great mound a second palace, the materials of which have been used for later structures. In its ruins was found a black obelisk, now in the British museum. A third stood on the W. face of the mound, and was built by Ivalush, identified with the Pul of the Hebrew Scriptures. A fourth palace was built mainly with materials taken from older structures by Esarhaddon, about 680 B. C., at the S. W. corner of the platform. A fifth was built at the S. E. corner by his grandson Asshur-emitilin, but much smaller than the rest, its chambers being panelled with plain unsculptured slabs; but some detached figures were found here. The largest palace hitherto explored stood at the S. W. corner of the mound of Koyunjik. It was built by Sennacherib about 700 B. C., and had an extent of nearly 100 acres. About 60 courts, halls, rooms, and passages have been discovered; some of the halls are 150 ft. square, and one passage is 200 ft. long; all are panelled with sculptured slabs of alabaster. The winged human-headed lions and bulls at the principal entrances are 20 ft. in height. Layard discovered 27 such doorways. In the same mound are the ruins of a second palace, erected by his son Esarhaddon, in which were discovered a series of sculptures representing a lion hunt, now in the British museum. Somewhat similar remains have been found in the other mounds. The Assyrian edifices were generally alike in plan, construction, and decoration. They were built upon enormous platforms raised about 40 ft. above the level of the plain, either by heaping up earth and rubbish or by masonry of sun-dried bricks. The platforms were faced with stone, and were ascended by broad flights of steps. The palaces themselves were constructed principally of sun-dried bricks, though kiln-burnt bricks were used for the solidier parts, and a coarse alabaster quarried near the city was used for ornament. The walls of these buildings were generally about 15 ft. thick, and were lined with sculptured alabaster slabs

from 8 to 10 ft. high, from 3 to 4 ft. broad, and about 18 in. thick. On the sculptured figures were inscriptions recording the exploits of the king by whom the building was erected. The apartments were high, and the spaces above the slabs were

plastered and painted, or were faced with bricks coated with enamel of elegant designs and brilliant colors. Ivory, bronze, and cedar from Mt. Lebanon were also used for decoration, which was heightened by gilding and painting. The principle of the arch was understood by the Assyrians. In some



From Entrance of Palace at Koyunjik.

of the palaces that have been discovered the panelling of sculptured slabs is nearly a mile in length. The principal and favorite subjects of these representations are war abroad and state at home. There are separate sculptured histories of each campaign of the king, and delineations of the taking of all the considerable cities that resisted him. These sieges and the treatment of the captives, which was barbarous in the extreme, as they were sometimes flayed alive, and representations of the king or his officers receiving tribute or homage from the conquered people, form the most common scenes of the bass reliefs. Many of the sculptures, however, are of a purely religious nature; some are wholly occupied by scenes of the chase; some are actually landscapes; and many represent thrones, chariots, or domestic furniture and utensils. No Assyrian women ever appear in the sculptures, though women are sometimes represented as captives or as begging for mercy from the walls of a falling city. As only the lower parts of the walls of the palaces of Nineveh have been found, it is uncertain what was the nature and arrangement of the upper parts. The absence of windows makes it difficult to comprehend how the apartments could have been lighted. Mr. Layard at first supposed them to have consisted of only a single story with apertures in the ceiling to admit light; but he afterward inclined to a plausible theory advanced with great ability and ingenuity by Mr. Fergusson, who maintains that there was an upper story supported by columns and open at the sides to admit light to the rooms below, from which the sunshine could be excluded at pleasure by means of curtains. This open upper story was used in fine weather, and as a balcony from which the king could show himself to his subjects or review his troops. The columns

which supported its roof stood some of them on the floor of the lower story, and other shorter ones on the walls of the lower story, whose immense thickness is thus accounted for. These edifices, though not equalling those of the Greeks in elegance and artistic taste, nor those of the Egyptians in solid magnificence and strength, must have been exceedingly gorgeous and beautiful structures. They were in part temples as well as palaces, the king being not only political chief but high priest of the nation, as was the case at one period in Egypt. "The interior of the Assyrian palace," says Mr. Layard, "must have been as magnificent as imposing. I have led the reader through its ruins, and he may judge of the impression its halls were calculated to make upon the stranger who, in the days of old, entered for the first time the abode of the Assyrian kings. He was ushered in through the portal guarded by the colossal lions or bulls of white alabaster. In the first hall he found himself surrounded by the sculptured records of the empire. Battles, sieges, triumphs, the exploits of the chase, the ceremonies of religion, were portrayed on the walls, sculptured in alabaster and painted in gorgeous colors. Under each picture were engraved, in characters filled up with bright copper, inscriptions describing the scenes represented. Above the sculptures were painted other events—the king, attended by his eunuchs and warriors, receiving his prisoners, entering into alliances with other monarchs, or performing some sacred duty. These representations were enclosed in colored borders of elaborate and elegant design. The emblematic tree, winged bulls, and monstrous animals were conspicuous among the ornaments. At the upper end of the hall was the colossal figure of the king in adoration before the supreme deity, or receiving

from his eunuch the holy cup. He was attended by warriors bearing his arms, and by the priests or presiding divinities. His robes and those of his followers were adorned with groups of figures, animals, and flowers, all painted with brilliant colors. The stranger trod upon alabaster slabs, each bearing an inscription recording the titles, genealogy, and achievements of the great king. Several doorways, formed by gigantic winged lions or bulls, or by the figures of guardian deities, led into other apartments which again opened into more distant halls. On the walls of some were processions of colossal figures—armed men and eunuchs following the king, warriors laden with spoil, leading prisoners, or bearing presents and offerings to the gods. On the walls of others were portrayed the winged priests, or presiding divinities standing before the sacred trees. These edifices were great national monuments, upon the walls of which were represented in sculpture or inscribed in alphabetical characters the chronicles of the empire. He who entered them might thus read the history and learn the glories and triumphs of the nation. They served at the same time to bring continually to the remembrance of those who assembled within them on festive occasions, or for the celebration of religious ceremonies, the deeds of their ancestors and the power and majesty of their gods." The palaces of Nineveh appear generally to have been destroyed by fire, which however could not injure the incombustible and massive walls of the lower part of the first story. These with their sculptures were probably at once buried by the falling in of the upper stories and of the higher part of their own structure, and the ruins were in time wholly concealed by the accumulation of rubbish from the villages subsequently built on them and by the mould of decaying vegetation, through the course of 3,000 years. Vases, jars, bronzes, glass bottles, carved ivory and mother-of-pearl ornaments, engraved gems, bells, dishes, ear rings, arms, and working implements have been found among the ruins, generally of elegant form, and indicating knowledge of the arts and a refined taste. The latest explorer of Nineveh, George Smith of the British museum, was probably the first visitor to the ruins who could read the inscriptions. His researches resulted in the collection of nearly 3,000 tablets or fragments of tablets of inscriptions, including among the fragments those of the Chaldean account of the deluge deciphered by him in 1872 from broken tablets in the British museum. He describes the mounds as remaining nearly in the state they were left by Layard.—The history of Nineveh and its sovereigns, as established by the latest researches, will be found in the article ASSYRIA. See Layard, "Nineveh and its Remains," "Nineveh and Babylon," and "Monuments of Nineveh," first and second series (1849-'53); Botta, *Mémoires de Ninive* (1849-'50); Fergusson, "Pal-

aces of Nineveh and Persepolis Restored" (1851); Fresnel, *Expédition scientifique en Mésopotamie* (1858); George Smith, "Assyrian Discoveries" (1875); and the articles ASSYRIA and CUNEIFORM INSCRIPTIONS, and the references there given.

NINGPO, a city of China, in the province of Chekiang, on the Takia or Ningpo river, near its mouth in the harbor of Chusan, 100 m. S. of Shanghai; lat. 29° 51' N., lon. 121° 32' E.; pop. in 1869 estimated at 500,000. It is surrounded by a dilapidated wall about 6 m. in circumference, 25 ft. high, and 15 ft. broad at the top, with five gates. The streets are long and broad, and the town is intersected by canals and connected with its suburbs by a bridge of boats. There are several temples, the most remarkable of which is a brick tower 160 ft. high, said to have been erected 1,100 years ago. There are government warehouses and public buildings. The houses are mostly one story high, but the shops are superior to those of Canton. In 1843 a missionary hospital was established at Ningpo, and all classes have resorted to it for surgical assistance. The ground in the neighborhood is flat and exceedingly fertile, but a range of barren hills runs along the seashore. The principal manufactures are silk, cotton, and woollen goods; and there are very extensive salt works. Vessels of about 300 tons can come up to the town, while those of greater size load and unload at the mouth of the river. The foreign imports are small.—Ningpo was taken by the British in 1841, and occupied for some months. It is one of the five ports opened to general intercourse by the treaty of Aug. 26, 1842. The Roman Catholics and several Protestant sects have flourishing missions here. In 1869 the various Protestant missions in Ningpo and Hangchow had 19 missionaries, 965 communicants, and 284 pupils.

NINON DE L'ENCLOS. See L'ENCLOS.

NIOME, in Grecian mythology, a daughter of Tantalus, king of Lydia, by a nymph. She had six sons and six daughters, and boasting herself superior to Latona, who had borne only two children, Apollo and Diana, to avenge their mother, slew all the children of Niome, who in her grief wept herself to stone.

NIORIUM. See COLUMBIUM.

NIORT, a town of France, in Poitou, capital of the department of Deux-Sèvres, on the Sèvre Niortaise, and on the Orleans and La Rochelle railway, 212 m. S. W. of Paris; pop. in 1872, 21,344, among whom are about 6,000 Protestants. It is the seat of a tribunal of the first grade, of a court of assizes, a commercial court, and a *conseil de prud'hommes*. It has a lyceum, a public library of 30,000 volumes, a museum for antiquities, several learned societies, and public baths. What remains of the former castle is now used as a prison. The town carries on a brisk trade, especially in cotton and woollen goods, leather, and gloves. It is celebrated for its flowers

and vegetables, and the public gardens are among the finest in France.

NIPHON. See NIPPON.

NIPIGON, or **Nepigon**, a lake of Ontario, Canada, intersected by the 50th parallel and the 88th meridian. It is elliptical in shape, being about 70 m. long from N. to S. and 50 m. from E. to W., though the shores are much indented by bays and the coast line measures 580 m. It is thickly studded with islands, is very deep, and abounds in fish. Its surface is 813 ft. above that of Lake Superior. It receives numerous streams, and discharges through Nipigon river (40 m. long) into Nipigon bay, the most northerly point of Lake Superior. The river contains falls and rapids, and expands in its course into four small lakes.

NIPISSING, a judicial district in the N. part of Ontario, Canada, lying along the W. bank of the Ottawa river; area, 14,650 sq. m.; pop. in 1871, 1,791. It contains Nipissing and various other lakes, and is watered by numerous streams.

NIPISSING, or **Nepissing**, a lake of Ontario, Canada, nearly midway between Lake Huron and the Ottawa river. It is about 50 m. long from E. to W. and 15 m. in greatest breadth, and discharges through French river (55 m. long) into Georgian bay. This river contains numerous islands and rapids. The lake receives several streams, the largest of which is Sturgeon river from the north.

NIPISSINGS, one of the Algonquin tribes of Canada, who came down with the Hurons to trade soon after the first French settlers arrived. They were then on Lake Nipissing and quite numerous; they were industrious, raising a little corn, catching and drying fish, and trading it with northern tribes for furs, becoming rich and comfortable. They were called sorcerers by the French from the number and influence of the medicine men. Europeans introduced diseases which thinned their numbers, and the Iroquois after destroying the Hurons compelled the Nipissings to take flight. They retired to Lake Alimipigon, which empties into Lake Superior from the north. Missions had been begun among them by Pijart, Menard, and Garreau at Lake Nipissing, and were revived by Allouez after their removal. As peace was restored they moved east, and most of the survivors finally joined the Iroquois and Algonquin mission formed by the Sulpicians at the lake of the Two Mountains, where a remnant still reside, the three tribes at the mission numbering 515 in 1873. The Nipissings had a feast of the dead, with curious rites, differing somewhat from that of the Hurons.

NIPPON, or **Nippon**, the name improperly given by Europeans to the principal island of the Japanese empire. The Japanese call the whole empire Dai Nippon, but had no separate name for the main island till 1873, when in a military geography published by the war department it was called Hondo. So long as Japan was an isolated country, the government dual, the land divided into hundreds of

principalities, her best ship a junk, and travel uncommon, there was no need to make the discriminations which modern geography demands. Nippon extends from lat. 33° 26' to 41° 35' N., and is separated on the north from the island of Yezo or Yesso by the strait of Tsugaru; on the south and southeast from the islands of Kiushiu and Shikoku by narrow straits; and on the southwest from Corea by the Corea strait, 120 m. wide. It stretches from N. E. to S. W. in a curved form, being about 800 m. long, with an average breadth of 100 m., the greatest breadth being 250 m.; the total area is about 80,000 sq. m.; pop. 25,000,000. It is divided into 53 provinces, and, besides several other large cities, contains Tokio (formerly Yedo), the present capital, Kioto, the former capital, Ozaka, and Nagoya. The coasts are deeply indented, have many good harbors, on which are the large cities, and are bordered by numerous islets and detached rocks. There are no large rivers. The mountain ranges have a general trend from N. to S., usually presenting a steep face to the east, and sloping on the W. side. The principal peak is the volcanic cone of Fusi-yama. (See JAPAN.)

NISARD. I. **Jean Marie Napoléon Désiré**, a French author, born in Châtillon-sur-Seine, March 20, 1806. At the age of 20 he became a regular contributor to the *Journal des Débats*, but after the revolution of 1830 he broke off his connection with it and wrote literary articles for the *National*. He opposed the new school of literature, and in his first publication, *Les poètes latins de la décadence* (1834), drew critical parallels between the minor Latin poets of the imperial period and the new French poets. His *Manifeste contre la littérature facile* was answered by Jules Janin, and the controversy became one of the chief literary events in Louis Philippe's reign. In 1835 Nisard was appointed by M. Guizot *maître de conférences* on French literature in the normal school; in 1836 chief secretary to the minister of public instruction and master of requests in the council of state; and finally in 1837 chief of the department of science and literature. In 1842 he was elected to the chamber of deputies, and attached himself to the conservative party. In 1843 he became professor of Latin eloquence in the collège de France. In 1850 he was elected to the French academy. In 1852 he was appointed general inspector of superior instruction, and succeeded Villemain in the chair of French eloquence at the Sorbonne. Here M. Nisard was at first coldly received, and in 1855 he was hissed from his chair by the students; but with the assistance of the police he continued his lectures. In 1857 he became director of the high normal school, his appointment being made the occasion of a reorganization of the school. He retired from this post in 1867, when he was made a senator, and he was also a member of the imperial council of public instruction. Besides the works above alluded to, he has published *His-*

toire et description de la ville de Nîmes (8vo, 1835); *Mélanges* (2 vols. 8vo, 1838); *Précis de l'histoire de la littérature française depuis ses premiers monuments jusqu'à nos jours* (18mo, 1840), a valuable sketch, which was first printed in the *Dictionnaire de la conversation*; and *Histoire de la littérature française* (4 vols. 8vo, 1844-'61; new ed., 4 vols. 12mo, 1863), a remodelling of his lectures at the normal school. His most important essays published in the reviews have been reprinted under the titles of *Études sur les grands hommes de la renaissance* (1856), and *Études de critique littéraire* (1858), containing his essays *Les deux morales*, and *Nouvelles études d'histoire et de littérature* (1864). He has also superintended the publication of the *Collection des classiques latins*, with a French translation (27 vols. 8vo, 1839 *et seq.*). **II. Marie Édouard Charles**, a French author, brother of the preceding, born in Châtillon-sur-Seine, Jan. 10, 1808. He left commercial for literary life, was from 1831 to 1848 a journalist attached to the service of Louis Philippe, and subsequently became connected with the ministry of the interior. Among his principal works are: *Histoire des livres populaires depuis le XV^e siècle jusqu'en 1852* (2 vols., 1854; 2d ed., 1864); *Les gladiateurs de la république des lettres aux XV^e, XVI^e et XVII^e siècles* (2 vols., 1860); and *Histoire de la langue populaire de Paris et de sa banlieue* (1873). In 1874 he proposed to publish, with notes, about 200 letters recently discovered by him in the library of Parma, including 152 from the count de Caylus and 48 from the abbé Barthélemy.

NISIBIS, in ancient geography, the capital of Mygdonia, a district of Mesopotamia, on the river Mygdonius. It was important as a commercial city and a military post, being frequently conspicuous during the wars of the Romans against Armenia, Parthia, and Persia. From the latter part of the 4th century it remained in the hands of the Persians. Its ruins are now visible near Nizibin in the Turkish vilayet of Diarbekir. Some critics identify the district in which it was situated with the Aram Zoba of Scripture; while others place the latter near Nizib on the Euphrates, a place known by the victory of Ibrahim Pasha over the Turkish army in June, 1839.

NISI PRIUS, a law term, which originated as follows. Anciently, nearly all actions in England of any importance were begun and tried before the courts of Westminster. But when the custom began of bringing actions of less value before these courts, and these grew to be numerous, the burden of coming from different and distant parts of England to London became very great; and a practice was introduced some centuries since of beginning a case in Westminster, as the law required, but continuing it from term to term, "unless before" the next term a court which could try the case should be held in the county where the cause of action arose or existed. The record was in

Latin; and the words *nisi prius* (unless before), being the essential part, gave name to the whole procedure. A court of eyre or of assize always did sit in the county in the vacation, and so the case was sure to be tried at home. Practically the phrase "*nisi prius* court," both in England and the United States, now signifies a court held by one of the judges, or less than a whole bench, usually with a jury, because such was the constitution of the assize courts before mentioned. Hence the determination of a law question at *nisi prius* is commonly made by one judge only, and on the spur of the moment. Many volumes have been published, both in England and the United States, of the decisions made at *nisi prius*; but they have not the authority of decisions made by the court sitting *in banco*, both because they are usually the decisions of one judge only, and also because the judges have not had the aid of full argument by counsel.

NISSA, or **Nish** (anc. *Naissus*), a town of European Turkey, in the vilayet of Prisrend, on the Nissava, an affluent of the Morava, 70 m. S. W. of Widdin; pop. recently estimated at from 6,000 to 16,000, including many Christians. It is the residence of a Turkish pasha and of a Greek bishop, and has famous thermal springs. It is chiefly remarkable for its fortifications, and for commanding military communications between Thrace, Bulgaria, and Servia. The plain of Nissa is very fertile. The town was formerly the capital of Servia. The ancient Naissus was an important city, and the birthplace of Constantine the Great.

NITRATES, salts formed by the combination of nitric acid with bases. Some of these are natural products, as the nitrates of potash, soda, lime, and magnesia; and others are artificially formed, as the nitrates of the metals. Several of both kinds are sufficiently important to require particular mention. None of these salts possess acid reaction; they are distinguished for their solubility in water, and hence, the acid not forming a precipitate with any base, its presence, free or combined, can be determined only by other methods, several of which are described in works on chemistry. At a high heat the nitrates undergo decomposition, sometimes being converted into free nitric acid and the oxidized base, and sometimes into oxygen, which escapes, and nitrous acid, which remains in combination with the base, forming a nitrite.—1. *Nitrate of Potash, Nitre, or Saltpetre*. First in importance among these salts is the nitrate of potash, or potassic nitrate, represented by the formula KNO_3 . It is an anhydrous, dimorphous white salt, having a specific gravity of 2.07, crystallizing in long six-sided prisms with dihedral summits, belonging to the rhombic system, and also in rhombohedral forms resembling ordinary calc spar. Frankenheim observed that when a solution of saltpetre is left to evaporate under the microscope, both kinds of crystals make their appearance together. When the evaporation

takes place slowly, the crystals are almost all rhombohedrons; but if these are touched with a prismatic crystal, the solution becomes turbid with formation of prismatic crystals. These prismatic crystals may be again converted into rhombohedrons by heating to near the fusing point. Nitrate of potash dissolves in $3\frac{1}{2}$ parts of water at 64° F., and in one third its weight of boiling water. It is insoluble in absolute alcohol, is not subject to deliquesce, has a sharp biting taste, and is without action on vegetable colors. It fuses without decomposition at 674.4° , and when cast into moulds solidifies to a white fibrous radiated mass known as *sal prunelle*. At a red heat it decomposes with formation of nitrite and evolution of oxygen, and at a higher heat the nitrite is also decomposed, with evolution of oxygen and nitrogen and formation of potassic oxide and peroxide. In large crystals it is apt to contain water mechanically held, which retains in solution some of the foreign salts derived from the mother liquor, as sulphate of soda and the chlorides of potassium and sodium. Smaller crystals are commonly purer; but common salt is almost always present to some extent, and is particularly injurious to saltpetre designed for the manufacture of gunpowder. A mixture of saltpetre with carbonaceous matters is explosive when highly heated; and when this mixture is intimately made, the product is gunpowder; sulphur, which is commonly introduced, not being essential for this property. (See GUNPOWDER.) Saltpetre is obtained both as a natural and artificial product. It is generated wherever nitrogenous animal and vegetable matters undergo decomposition in the presence of moist calcareous earth containing potash, the temperature being generally above 60° F. Ammonia is produced, which is decomposed, its nitrogen forming with oxygen nitric acid, which combines with the alkaline earths present. Nitre forms naturally upon the walls of cellars and of caves as an efflorescence. On the surface of some soils in warm countries it also appears in this form after the rainy season, and in sufficient quantity to render its collection profitable. In Hindostan it is thus produced so abundantly and cheaply, that our own market is largely supplied from Calcutta. To separate the nitre from the earth which contains it, this is lixiviated with water, which dissolves out the soluble salts; and in the large vats into which the liquid is conveyed the salts crystallize as the water is evaporated by solar or artificial heat. The first crystals that form are crude saltpetre; nitrates of lime and magnesia mostly remain in the mother liquor, and are either thrown away with it, or in some cases are decomposed by treatment with carbonate of potash, and their nitric acid is thus recovered in new quantities of nitre. Natural saltpetre beds are also worked in Hungary, Egypt, Spain, and in various warm countries. In hot countries it does not appear that the immediate presence of decomposing animal mat-

ters is essential to the production of saltpetre; but ammonia thus derived and existing in the atmosphere is no doubt brought to the potash. In temperate climates the salt is artificially produced in what are called in Europe saltpetre plantations. These are compost heaps of animal and vegetable matters intermixed with earth, and with potash, lime, and magnesia, presented in porous form, as in ashes, marl, chalk, and old mortar. The heaps are exposed to the air, but it is better to protect them from the rain. Gutters are excavated around them, and in these are kept liquids from the cattle stalls and other similar fluids rich in nitrogen, with which the materials are occasionally moistened. In Sweden, the heaps are worked over once a week in summer and once a month in winter, and twigs are introduced to keep them open. The work is generally continued three years, until the product of saltpetre amounts to about 5 oz. in 1,000 cubic inches. For an annual product of 10 cwt. it is necessary to work over full 120 cubic fathoms of earth, of which one third becomes ripe each year, and is removed from time to time from the outermost layers to be lixiviated. The crude product obtained is afterward purified by repeated solutions and crystallizations. Saltpetre is now extensively manufactured by the double decomposition of the nitrate of soda from Chili and the chloride of potassium from the salt mines of Stassfurt, Germany. Besides its use for making gunpowder, nitre is employed in the manufacture of nitric acid. It is also a useful oxidizing flux in metallurgical operations, and in medicine is much used for its cooling properties in inflammatory affections, and also as a promoter of perspiration and the secretions of the liver. In acute rheumatism it is sometimes administered in doses, largely diluted with water, to the extent of from one to two ounces, though half an ounce in concentrated solution causes heat and pain in the stomach, which may be followed by convulsions and death. When taken in poisonous quantities there is no antidote known, and the only relief is by the use of the stomach pump, laudanum to allay the pain, and mucilaginous drinks and cordials. Nitre is also a powerful antiseptic, and is used in the preservation of meats, as for curing hams.—2. *Nitrate of Soda*. Another variety of nitre, called cubic nitre, is the salt nitrate of soda or sodic nitrate (NaNO_3). It crystallizes in obtuse rhombohedrons of specific gravity 2.26. It is deliquescent, soluble in about twice its weight of cold water, and has a cooling saline taste. It fuses at 591° , and is decomposed at a higher temperature. It is found in beds among the hills in the province of Tarapaca which skirt the coast of Peru, and at their base on the W. side of the pampa over an extent of not less than 150 m. Under the nitrate of soda is marl impregnated with saline matter and mixed with fragments of shells. The nitrate of soda, as quarried, is very variable in quality, some yielding not

more than 25 per cent. and some three times as much of the genuine salt. It is mostly worked with the pick and shovel, but is sometimes so compact that the beds have to be blasted. Portions of the salt are pure white like loaf sugar, and others are colored reddish brown, lemon yellow, and gray. Its average composition was found by Dr. A. A. Hayes to be as follows: nitrate of soda, 64.98; sulphate of soda, 3.00; chloride of sodium, 28.69; iodic salts, 0.63; shells and marl, 2.60; total, 99.90. The extraction and refining of the salt afford employment to a large part of the inhabitants of the province. It is taken to Iquique for shipment to all parts of the world. It is used in the manufacture of nitric acid, of saltpetre, and of iodine, but its tendency to deliquesce renders it unfit for that of gunpowder; it is, however, a valuable fertilizer. The salt is reported to occur in large quantities in Pernambuco, west of Ipu, the formation extending 15 to 20 m.—3. *Nitrate of Silver, or Lunar Caustic*. Among other nitrates the most important is the nitrate of silver, or argentic nitrate (AgNO_3). It may be prepared by dissolving pure silver in nitric acid, evaporating to dryness, and fusing to expel nitrous acid, and to destroy impurities which may have been received during the operation, dissolving in water, and crystallizing. The salt crystallizes in square tables, which are colorless and anhydrous, having a specific gravity of 4.336. At 426° it fuses, and may then be cast into the crystalline sticks which pass under the names of lunar caustic and *lapis infernalis*, and are employed in surgery. At higher temperatures it is reduced to a metallic state. Nitrate of silver acts powerfully but superficially as a caustic, giving rise to a white slough, which blackens on exposure to the light. It may be used in solutions of all strengths, and also solid. In the latter form it is sometimes diluted with alum or sulphate of copper. The sticks of nitrate of silver are occasionally made to contain chloride of silver in order to render them less brittle. Its solution in pure water remains colorless; but if the smallest quantity of organic matter be present, it is soon discolored when exposed to the light. It is thus a delicate test of the presence of organic matter. With albumen and fibrine it forms insoluble compounds, and may be employed to remove them from solution. The property of the solution to turn black by the reduction of the oxide of the silver, when the fluid is applied to organic substances and exposed to the light, renders it of important use for marking linen. The so-called indelible ink is prepared for this purpose by dissolving one part of the salt and four parts of gum arabic in four parts of water, and adding a small quantity of India ink. The spot to be marked is first wetted with a solution of carbonate of soda and dried, and when written upon it is exposed to the sunlight. The spots may be removed by converting the silver with a few drops of iodine into the iodide,

and dissolving this by a solution of hyposulphite of soda, or a dilute solution of caustic potash. A hair dye is also prepared with nitrate of silver by dissolving it in ether. The nitrate is extensively used in photography on account of the action of light upon it. (See PHOTOGRAPHY.)—4. *Nitrate of Ammonium, or Ammonic Nitrate* (*nitrum flammans*, NO_3NH_4 , or according to the old formula $\text{NH}_4\text{O}, \text{NO}_3$). Nitrate of ammonium is formed by the action of the electric current on a mixture of nitrogen and oxygen with an excess of hydrogen; also by passing sulphuretted hydrogen gas through dilute nitric acid; but the common method is to add a slight excess of aqua ammonia to nitric acid. It ordinarily crystallizes in long flexible needles, or deposits as an amorphous mass; but if the crystallization takes place slowly, six-sided prisms like those of nitrate of potash may be obtained, of specific gravity 1.635. When this salt is dissolved in water, there is a considerable disappearance of heat, and it is often used in frigorific mixtures. It melts at 226°F. , and at 482° is completely decomposed, with conversion into nitrous oxide or laughing gas and water ($\text{NO}_3\text{NH}_4 = \text{N}_2\text{O} + 2\text{H}_2\text{O}$). It is the material universally used for the production of laughing gas. (See NITROUS OXIDE.)—5. *Nitrate of Barium, Baric Nitrate, or Baryta Saltpetre* (Ba_2NO_3), is commonly produced by treating a solution of sulphide of barium, or of the carbonate of barium, which is found native as a mineral, with nitric acid. It crystallizes in anhydrous regular octahedral crystals, of specific gravity 3.184 (Karsten). Unless the solution is dilute, nitric acid will cause precipitation without evaporation. When heated it decrepitates strongly, then fuses, and at a high temperature all the acid is expelled, with evolution of oxygen and nitrogen, the residue being pure baric oxide, or barytes. (See SULPHATE OF BARIUM, under SULPHATES.)—6. *Nitrate of Bismuth, or Bismuthous Nitrate* ($\text{Bi}_3\text{NO}_3, 5\text{H}_2\text{O}$; sp. gr. 2.376), is easily formed by dissolving the metal or the oxide or carbonate in nitric acid of moderate strength. The concentrated solution must be filtered through asbestos, as it corrodes paper from its readiness to part with a portion of its acid. When the salt is largely diluted with water, an acid salt remains in solution, while an insoluble basic subnitrate ($\text{Bi}_2\text{O}_3, 2\text{HNO}_3$) falls, called by the older writers magistery of bismuth. Another basic nitrate ($\text{Bi}_2\text{O}_3, \text{HNO}_3$) is known, which like the other loses acid by washing. The subnitrate is a heavy white powder of faintly sour taste, and reddens litmus paper. It is used in medicine as an antispasmodic, absorbent, sedative, and astringent. When long used it produces scorbutic symptoms, a proof that it is absorbed. It is principally employed in painful affections of the stomach, in spasmodic diseases, and in dysentery and diarrhoea. Rayer employed it with advantage in diarrhoea of phthisis and typhus. M. Monneret recommends it as a drying application. Dr. W. R.

Hamilton of St. Augustine, Ill. ("American Journal of Medical Sciences," Oct. 1, 1865), recommends it to prevent pitting in smallpox.

—7. *Nitrate of Cobalt, or Cobaltous Nitrate* ($\text{Co}_2\text{NO}_3, 6\text{H}_2\text{O}$), is prepared by dissolving the oxide in nitric acid. It forms pinkish red, prismatic, deliquescent crystals of specific gravity 1.83. It is often employed as a reagent for the blowpipe, magnesium compounds yielding a pink-colored mass, those of zinc green, and those of aluminum blue. Adding a concentrated solution of potassic nitrate to a solution of cobaltous nitrate, acidulated with nitric or acetic acid, throws down a beautiful orange-yellow precipitate, consisting of microscopic four-sided prisms, with pyramidal summits. Cobalt in nickel may be discovered by its means.—8. *Nitrate of Copper, or Cupric Nitrate* ($\text{Cu}_2\text{NO}_3, 6\text{H}_2\text{O}$), is made by dissolving copper in slightly diluted nitric acid. During the operation nitric oxide gas (NO) is copiously given off, $3\text{Cu} + 8\text{HNO}_3$, yielding $3(\text{Cu}_2\text{NO}_3) + 2\text{NO} + 4\text{H}_2\text{O}$. Concentrated acid yields peroxide of nitrogen (NO_2). Cupric nitrate is a beautiful blue, highly deliquescent salt, crystallizing in rhomboidal prisms. At temperatures above 59°F ., it crystallizes with $3\text{H}_2\text{O}$ in needles of specific gravity 2.047, which are very soluble in alcohol. Moderate heat converts it into insoluble basic nitrate, $\text{Cu}_2\text{NO}_3, 3\text{CuH}_2\text{O}_2$. A further heat expels all the acid, leaving black oxide. Cupric nitrate is used in medicine as an application to sloughing ulcers. If the crystals are folded in tin foil, they will act so powerfully upon the metal as to emit sparks, the tin being converted into stannic oxide.—9.

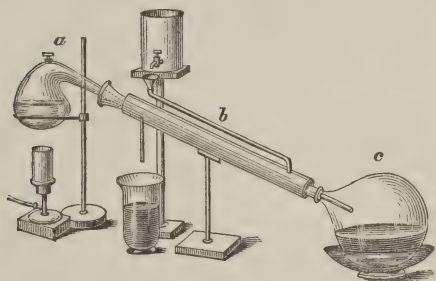
Nitrates of Iron. These are commonly known as the protonitrate and the pernitate; in the new nomenclature they are known respectively as ferrous nitrate and ferric nitrate. The ferrous nitrate may be formed by digesting iron turnings in very dilute nitric acid, and also by dissolving protosulphide of iron in cold dilute nitric acid of specific gravity less than 1.12. It crystallizes in pale green rhombohedrons, having the formula $\text{Fe}_2\text{NO}_3, 6\text{H}_2\text{O}$. This salt is used in dyeing. The pernitate or ferric nitrate is prepared by digesting metallic iron in nitric acid of specific gravity from 1.12 to 1.3. A solution of it is used as an astringent and tonic in medicine, and as a lotion in surgery, under the name of *liquor ferri nitratis* (United States Pharmacopœia).—10. *Nitrates of Lead.* Lead forms several salts with nitric acid, the principal of which are plumbic nitrate (Pb_2NO_3) and dibasic plumbic nitrate ($\text{Pb}_2\text{NO}_3, \text{PbH}_2\text{O}_2$). The first is formed by dissolving metallic lead or plumbic oxide (litharge, PbO) in an excess of slightly diluted nitric acid. It crystallizes in regular anhydrous octahedra, generally opaque. A dull red heat reduces it to protoxide, with evolution of oxygen and nitric peroxide. Caustic ammonia added to excess of the nitrate forms the dibasic salt. The nitrate of lead is used in chemistry in preparing other lead compounds, as for instance

the iodide, which is done by the double decomposition of this salt with iodide of potassium. It is also used as a reagent in the laboratory. In medicine it is employed as an application to excoriated surfaces, and its solution forms Ledoyen's disinfecting fluid.—11. *Nitrates of Mercury.* Mercury forms a greater number of nitrates than any other metal. Among them are the normal subnitrate, or mercurous nitrate, and the normal mercuric nitrate, the latter of which is used in medicine. The *liquor hydrargyri nitratis* is extensively used in the London hospitals for cutaneous diseases, and it has been employed as an application in boils, carbuncles, acne, lupus, and sloughing ulcers. In treating boils a full-sized drop of the liquor is applied to the apex of the furuncle. The *unguentum hydrargyri nitratis* forms the citrine ointment of the pharmacopœias, and is used as a stimulant and alterative application in various cutaneous affections, particularly of the scalp.—All the other inorganic as well as organic nitrates of importance will be found under the heads of their bases.—12. *Alcoholic Nitrates, or Nitric Ethers.* When nitric acid is heated with alcohol, part of the alcohol is oxidized, and the nitric acid is reduced to nitrous acid, which acting on the remainder of the alcohol produces nitrous ether and other bodies; but if urea is added to the liquid, it immediately decomposes the nitrous acid, and nitrate of ethyl is formed. The other alcohol radicles may also be transformed by the action of nitric acid in the presence of urea into corresponding nitric ethers, as amyl nitric ether, methyl nitric ether, &c. They have some resemblance to the nitrous ethers. (See NITRITES.)

NITRE. See NITRATES.

NITRIC ACID, or Hydric Nitrate, the most important compound of oxygen and nitrogen, formed by the union of nitric anhydride or anhydrous nitric acid (see NITROGEN) and water. It was formerly called *aqua fortis*, and was known to the alchemists; but its composition was first determined by Cavendish in 1785. When nitrogen is mixed with about 12 times its volume of hydrogen, and a jet of the mixed gases is burned in the air or in oxygen, the water produced will be found to contain a small quantity of nitric acid; and it was his experiments on the formation of water that led Cavendish to the discovery of the acid. If a number of electric sparks are passed between two points over moistened litmus paper, a red spot will be produced on the paper from the action of nitric acid which has been formed by the combination of atmospheric nitrogen and oxygen in the presence of watery vapor; and during a thunder storm the acid is produced in a similar manner in quantity sufficient to be detected by delicate tests. The formula of nitric acid is HNO_3 , and according to modern theory it is a compound of hydrogen with a radicle called nitron (NO_3), and is regarded as a salt of hydrogen. The nitron is produced by the union of water with nitric

anhydride ($\text{H}_2\text{O} + \text{N}_2\text{O}_5 = \text{H}_2\text{N}_2\text{O}_4$ or HNO_3), and is the form in which nitric acid is converted when it unites with a metal to form a nitrate. The production of nitric anhydride (N_2O_5) was effected by Deville by passing a current of dry chlorine gas slowly over crystals of dry nitrate of silver, the salt being first raised to about 203°F . till decomposition commences, and then lowered to about 140° , the operation being conducted with the greatest care. The chlorine displaces the nitron of the nitrate of silver (AgNO_3), chloride of silver (AgCl) is formed, and the nitron breaks up into nitric anhydride and oxygen, the latter escaping ($2\text{N}_2\text{O}_5 = \text{N}_2\text{O}_4 + \text{O}$). The receiver being surrounded by a freezing mixture, the anhydride condenses into brilliant colorless crystals derived from the right rhombic prism, melting at 85° and boiling at 113° , with decomposition. This theory of nitric acid has not the apparent simplicity of the older views, which regarded the acid as a monohydrate of pentoxide of nitrogen, or HO_2NO_3 , and the metallic nitrate as a compound of NO_2 , with the oxide of the metal.—*Manufacture*. Nitric acid is obtained for chemical purposes from one of the alkaline nitrates. When potassic nitrate is heated in a retort with strong sulphuric acid (H_2SO_4), double decomposition takes place, bisulphate of potash (hydric potassic sulphate) and nitric acid being formed,



Laboratory Apparatus for Nitric Acid.

as shown in the following equation: $\text{KNO}_3 + \text{H}_2\text{SO}_4 = \text{HNO}_3 + \text{KH}_2\text{SO}_4$. The bisulphate remains in the retort, while the nitric acid distils over and may be condensed in a receiver. In preparing small quantities, equal weights of nitre and oil of vitriol are placed in a glass retort, and the distillation takes place as represented in the figure; the retort, *a*, containing the materials, and the Liebig's condenser, *b*, effecting the cooling while the product is on its way to the receiver, *c*, which is placed in a shallow vessel containing cold water or ice. During the process red fumes appear in the retort, in consequence of the conversion of a part of the acid into some of the lower oxides of nitrogen, and a powerfully corrosive yellow liquid condenses in the receiver. On the large scale, large cylindrical iron retorts, lined with fire clay above the level of the fluid mass, and placed horizon-

tally, are employed, instead of the small glass ones, and a series of large earthen Woulff's bottles replace the ordinary receiver, convenient arrangements being provided for the introduction of the materials. It is usual to employ nitrate of soda in place of nitrate of potash on account of its cheapness, and also to use a smaller proportion of sulphuric acid. In this case, instead of bisulphate (KH_2SO_4), there remains in the retort the normal sulphate (K_2SO_4), but a greater degree of heat is required to expel the last portions of acid.—*Properties*. The acid obtained in the manner described has a reddish yellow color, in consequence of the presence of some of the lower oxides of nitrogen. It may be freed of these by redistillation with an equal bulk of oil of vitriol, and passing a current of dry air through the liquid, which should be gently warmed and protected from the light. But the acid is so unstable, from its disposition to part with its oxygen, that it soon becomes partially decomposed. When pure it is a limpid, fuming, colorless, powerfully corrosive liquid, having a specific gravity of 1.53 at 59° , of 1.559 at 32° , freezing at -67°F ., and boiling at 187° . The boiling point from its commencement rises, owing to decomposition, until it reaches 250° , at which point the distillation goes on. The acid contains a larger proportion of water, the composition being $2\text{HNO}_3, 3\text{H}_2\text{O}$, but appears to be a hydrate of considerable stability, having a specific gravity of 1.424. A weaker acid when distilled parts with a portion of its water till it arrives at this density, and a stronger acid becomes reduced to the same, so that an acid of the above density can be continuously distilled for an indefinite time; but by varying the pressure Roscoe found that the density and consequently the proportion of water varied. The following table, abbreviated from Kolb, shows the specific gravity and percentage of hydric nitrate (HNO_3) contained in acids of different strength, at 32° and 59°F .:

HNO_3 in 100 parts by weight.	SPECIFIC GRAVITY.	
	At 32° .	At 59° .
100.00	1.559	1.530
90.00	1.522	1.495
80.00	1.484	1.460
69.20	1.441	1.419
59.59	1.391	1.372
49.97	1.334	1.317
40.00	1.267	1.251
30.00	1.200	1.185
20.00	1.132	1.120
4.00	1.026	1.022

The nitric acid of commerce is generally contaminated with a variety of foreign matters, such as sulphuric acid, chlorine, and oxide of iron, which are easily detected by the usual tests. It varies in strength, often containing more than 50 per cent. of water. In consequence of its disposition to part with oxygen, nitric acid is extensively employed as an oxidizing agent. If the strong acid is dropped on

hot pulverized charcoal, combustion will be produced. If it is mixed with oil of vitriol and poured upon oil of turpentine, the latter will burst into a flame. It parts with its oxygen to phosphorus with explosive violence. It rapidly corrodes organic substances, particularly animal tissues, and when slightly diluted stains the skin, wool, feathers, and albuminous bodies a bright yellow. It acts with great energy upon the more oxidizable metals; gold, platinum, rhodium, and iridium alone resist its oxidizing power. Its action is most energetic when its specific gravity is between 1.35 and 1.25, and the presence of nitrous acid increases its power. The action of nitric acid upon metals is not so simple as that of sulphuric acid, whose components are held together with stronger affinities. According to one view, when sulphuric acid unites with a metal, the latter first becomes oxidized by combining with the oxygen of the water, while the hydrogen is set free. Another and later opinion is that the metal simply displaces the hydrogen from its union with the sulphion, SO_4 , thus: $\text{HSO}_4 + \text{M} = \text{MSO}_4 + \text{H}$. When nitric acid is employed, the metal in the same way displaces the hydrogen from its union with the nitron (NO_3), but hydrogen is not evolved, because it instantly unites with oxygen derived from decomposing acid or its lower oxides. The mode of action varies with the metal acted upon and other circumstances. When silver is dissolved in the cold in an excess of diluted nitric acid, nitrous acid (HNO_2) is formed, and there is no evolution of gas. If the solution is warm, the action is more violent, and nitric oxide (NO) is disengaged, or a similar effect may be obtained by employing a more oxidizable metal, as copper or mercury. When the acid is pretty strong (sp. gr. 1.4), peroxide of nitrogen is disengaged, and by raising the temperature free nitrogen is also evolved, the acid undergoing complete deoxidation. A metal having a stronger affinity for oxygen, as zinc, will cause the evolution of nitrous oxide; and when the acid is concentrated ammonia is one of the products, and may be found combined with the excess of acid. The principal uses of nitric acid are in the manufacture of nitrates of the metals and of sulphuric acid, where it completes the process of oxidation by furnishing an addition equivalent to the sulphurous acid. (See SULPHURIC ACID.)

NITRITES, salts produced by the union of nitrous acid with bases; general formula, MNO_2 . The principal metallic salts are those of potassium, sodium, barium, ammonium, copper, lead, and nickel. The nitrites of lead form an interesting series, but are of more professional than general interest; and the same remark applies to the double potassium nitrites with other metals. The nitrites are usually prepared by reducing the nitrates. Nitrite of potassium and of soda may be obtained by decomposing potassic nitrate at a red heat, dissolving the residue in water, crystalli-

zing out the remaining nitrate, and evaporating. —The alcoholic nitrites, or nitrous ethers, are bodies of great interest, to the physiologist as well as chemist. The principal are the nitrites of amyl, ethyl, methyl, and butyl. The nitrite of amyl ($\text{C}_5\text{H}_{11}\text{NO}_2$) is an inflammable liquid, of a fruity pear-like odor, reddish yellow color, and specific gravity 0.877, boiling at 196° . It may be prepared by passing nitrous vapors into amylic alcohol in a gently heated retort, rectifying the distillate, and collecting those portions going over at 196° . When inhaled it acts as a powerful stimulant to the heart, the excitement being followed by greatly diminished power of the organ and contraction of the external vessels. It suspends the respiration of animals, but the effect may be stopped short of death, the result being a state resembling trance. The appearance after death differs with the mode of administration. If the nitrite is given rapidly, the lungs and brain are found free from congestion, and the left side of the heart empty, but the right cavities will be engorged. When administered slowly, the lungs and brain are congested and both sides of the heart contain blood. Nitrite of ethyl, or nitrous ether, $\text{C}_2\text{H}_5\text{NO}_2$ (formerly called nitric ether, saltpetre, and naphtha), was first observed by Rumkel in 1681, but its composition was first exactly determined by Dumas and Boullay. It is prepared by distilling a mixture of equal parts of alcohol and nitric acid, a gentle heat being applied at the commencement. The distillate is received in a series of Woulf's bottles half filled with salt water. The nitrous ether collects on the surface of the brine. It is a yellowish liquid, having the odor of apples, sparingly soluble in water, but perfectly so in all proportions in alcohol. It boils at 62° , and has a specific gravity of 0.947. It is decomposed by the action of caustic potash into nitrite of potassium and alcohol. The sweet spirits of nitre of pharmacy is a solution of nitrous ether, aldehyde, and several other substances, prepared by distilling 3 lbs. of alcohol with 4 lbs. of nitric acid. Nitrite of methyl (CH_3NO_2) is prepared by treating wood spirit with nitric acid and copper turnings. When a liquid, it has a specific gravity of 0.991, and boils at 11°F . Its smell resembles that of nitrous ether. Nitrite of butyl ($\text{C}_4\text{H}_9\text{NO}_2$) has been employed by Tyndall with advantage in experiments upon polarized light.

NITROGEN (Gr. *νίτρον*, nitre, and *γεννάειν*, to generate), an elementary gaseous body, forming about four fifths of the bulk of the atmosphere. It derives its name from being also an essential constituent of nitre. It was discovered by Rutherford in 1772, but its properties were more particularly investigated by Lavoisier in 1775, and also by Scheele about the same time. Lavoisier estimated the proportion contained in the atmosphere, and gave it the name of azote (Gr. *a* privative and *ζωή*, life), because it is incapable of supporting

life when breathed. The name nitrogen was afterward given by Chaptal. It is most conveniently obtained by removing the oxygen and carbonic acid gases from the atmosphere. The readiest mode is to burn phosphorus in a shallow vessel floating on water, in a bell jar of air. The phosphorus combines with the oxygen, forming phosphoric acid, which with the small amount of carbonic acid is absorbed by the water. A simple method is to place a stick under a jar of air over water, and let it remain three or four days, when nearly pure nitrogen will be found, occupying about four fifths of the previous volume. Other easily oxidizable substances, as moistened iron filings, will effect the same result. Nitrogen may also be obtained by the action of chlorine on an excess of aqua ammonia, and also, in a state of purity, by decomposing nitrite of ammonia by heat.—The symbol of nitrogen is N, its atomic weight 14, and its specific gravity 0.9713. It is colorless, tasteless, and inodorous, and liquefies under a pressure of 200 atmospheres. Water dissolves about $\frac{1}{30}$ of its volume at ordinary temperatures. It is remarkable for its weak affinity for other bodies, presenting a great contrast to oxygen in this respect. It does not combine with any element with sufficient energy to produce much elevation of temperature, and therefore is not a supporter of combustion. A taper placed in it is immediately extinguished. An animal placed in the undiluted gas soon dies, and an attempt to breathe it will produce a sense of suffocation, not from any poisonous property, but simply because it prevents the access of oxygen, which is necessary to fit the blood to perform its functions. It is therefore to be regarded as a diluter of the atmosphere. Nitrogen is an extensively distributed element, entering into the composition of a great number of bodies. It is an essential constituent of many valuable and powerful medicines, such as quinine and morphine, and dangerous poisons, such as cyanogen and its compounds and strychnia. It is an important constituent of those tissues and fluids of plants and animals which contain albumen and fibrine, commonly known as azotized or nitrogenous tissues. The most important inorganic compounds are with hydrogen, forming ammonia; with chlorine, forming a chloride; with carbon, forming cyanogen; and with oxygen, forming a remarkable series of compounds possessing the greatest interest to the chemist and physiologist, which are called the oxides of nitrogen. They are nitrous oxide or laughing gas, N_2O ; nitric oxide, NO ; nitrous anhydride, N_2O_3 , forming nitrous acid with water; peroxide of nitrogen, NO_2 or N_2O_4 ; and nitric anhydride or anhydrous nitric acid, N_2O_5 , which in combination with water forms nitric acid.—Nitrous oxide will be treated in a separate article, and the other principal oxides in this place. 1. Nitric oxide, formerly called deutoxide of nitrogen, is a gaseous body produced by the partial deoxidation of nitric acid.

The direct union of nitrogen with oxygen is indeed difficult, and therefore it is usually effected indirectly. The common method is to dilute the acid with about twice its bulk of water and pour it upon copper turnings or metallic mercury in a retort or flask. A gentle heat assists the process. Red fumes appear in the retort in consequence of the production of peroxide of nitrogen; these may be absorbed by collecting the gas over water. The reaction consists in the displacement of hydrogen, the formation of a nitrate, and the abstraction of oxygen from the remaining acid sufficient to reduce it to NO . Nitric oxide is a colorless gas having a specific gravity of 1.039. It is irrespirable, possessing a strong disagreeable odor. In 1877 it was successfully liquefied. It dissolves in about 20 times its bulk of water, and is more stable than the other oxides of nitrogen, resisting the decomposing power of a red heat; but when electric sparks are passed through a mixture of the gas with vapor of water, it is decomposed into nitrogen and nitric acid. In contact with moist iron filings or a sulphide of sodium or potassium, it is converted into nitrous oxide. A lighted taper plunged into it is extinguished, and also phosphorus when first kindled; but if it is burning strongly, the heat will decompose the gas when the phosphorus will continue to burn, and with a brilliancy rivalling that afforded by pure oxygen. 2. Nitrous anhydride (N_2O_3) was formed by Dulong, by mixing in an exhausted flask one volume of oxygen with four volumes of nitric oxide, both in a dry state. Brownish red fumes of nitrous anhydride are condensed into a volatile blue liquid having a red vapor. Liebig obtained it by the action of eight parts of nitric acid on one of starch. A small quantity of water converts nitrous anhydride into nitrous acid, the liquid changing from a blue to a dark green ($N_2O_3 + 2H_2O = 2HNO_2$). An excess of water converts it into nitric acid and nitric oxide. The body NO_2 which is united to hydrogen in nitrous acid is called nitrosion, a radicle, and it is this which unites with bases to form nitrites. (See NITRITES.) 3. Nitric peroxide, or peroxide of nitrogen (N_2O_4 or NO_2), is seen in the red fumes which appear when air is admitted into a vessel containing nitric oxide. When one volume of oxygen and two of nitric oxide, well dried, are passed through a dry tube immersed in a freezing mixture, it may be obtained in crystals. They melt at $14^\circ F.$, and form an orange-colored liquid till the temperature reaches 71.6° , when it boils and passes into a brownish red vapor. This body possesses the remarkable property of not freezing at -6° after it has once been melted. Peroxide of nitrogen was long thought to be an anhydride, and was called hyponitric acid; but it does not form salts having a corresponding radicle, and is decomposed by bases with the formation of a nitrate and a nitrite. It is readily decomposed by water, a trace of moisture being sufficient to prevent the formation

of the crystalline compound, but causing instead the production of a green liquid, probably composed of nitrous and nitric anhydride, which with water forms nitrous and nitric acids. The investigations of Playfair and Wanklyn indicate that the molecular constitution of peroxide of nitrogen at low temperatures is N_2O_4 , while at high temperatures it is NO_2 ; an opinion founded principally upon the great change in the specific gravity.—Nitrides are combinations of nitrogen with the metals, and with phosphorus, boron, and silicon, without the intervention of another element. The binary combinations of nitrogen with the non-metallic elements or radicles might be considered as nitrides, but the term is restricted as above stated. The metallic nitrides have the general formulas RN , R_2N , R_3N , the last being analogous to ammonia, and are all easily decomposed by heat, sometimes with explosion. They are usually formed by the action of ammonia on metallic oxides or chlorides, but may be obtained by the direct action of atmospheric nitrogen on the metals at the moment of their separation from their oxides by charcoal. Nitride of copper is formed by passing dry ammonia over cupric oxide at a temperature not higher than $482^\circ F.$, and other metallic nitrides may be obtained in a similar way. Nitride of boron was discovered by Balmain, who obtained it by heating boric anhydride with cyanide of potassium or cyanide of zinc. The nitrides of phosphorus and silicon will be mentioned under those heads.

NITRO-GLYCERINE. See EXPLOSIVES.

NITRO-MURIATIC ACID, a mixture of nitric and hydrochloric acids, called by the alchemists *aqua regia*, because it possesses the power of dissolving the "king of metals," gold. Both platinum and gold are insoluble in either acid separately, but are readily attacked by the mixture, forming chlorides. Chlorine is liberated, the action being assisted by the presence of the metal, and polarization of the molecules of the acid is produced, the chlorine in its nascent state combining with the metal. Red fumes also appear, which were at one time mistaken for peroxide of nitrogen, it being supposed that the liberated hydrogen simply deoxidized the nitric acid; but it has been found that two gases, nitric oxychloride ($NOCl_2$) and nitrous oxychloride ($NOCl$), are formed instead, the former in the earlier and the latter in the later stages of the process. The action of *aqua regia* on metals produces perchlorides, and the oxides which may be formed by the addition of an alkali to their solutions are corresponding peroxides.

NITROUS ACID. See NITROGEN.

NITROUS OXIDE (N_2O), formerly called protoxide of nitrogen or laughing gas, a chemical compound which may be prepared by the action of equal parts of nitric and sulphuric acid, diluted with ten parts of water, upon metallic zinc. Sulphurion of the sulphuric acid unites with the metal, and the nascent hydrogen de-

oxidizes the nitric acid. The reaction is represented in the following equation: $8HNO_3 + 2HNO_2 + 8Zn = 8ZnSO_4 + 5H_2O + N_2O$. The gas obtained in this way is impure, and it is better to procure it by decomposing nitrate of ammonia. The salt being placed in a retort and a gentle heat applied, it melts at 226° , and at 482° or 500° is converted into nitrous oxide and water ($H_4N, NO_3 = 2H_2O + N_2O$). Nitrous oxide is a colorless transparent gas, having a specific gravity of 1.527. According to Bunsen, 100 volumes of water at 32° dissolve 130 of the gas, at 59° 77 volumes, and at 75° 60 volumes. It should therefore be collected over warm water. It has a faint sweetish taste and smell. At a temperature of 45° a pressure of 50 atmospheres reduces it to a colorless liquid of specific gravity 0.9004, having a boiling point of -133° . The liquid nitrous oxide mixed with sulphide of carbon and placed *in vacuo* caused, according to Natterer, a reduction of temperature to -220° , the greatest degree of cold that has yet been attained. It supports combustion with a power approaching that of oxygen. When respired it produces an exhilaration of the whole system, with a disposition to muscular exertion; and there is often a state of great mental exaltation, and a disposition to uncontrollable laughter, from which it has received the name of laughing gas. It has the power of diminishing and destroying the sense of pain, a fact known to Sir Humphry Davy (see ANÆSTHETICS), and if its administration is continued of producing a state of unconsciousness. It is used for this purpose in the extraction of teeth, and also in surgical operations, although sulphuric ether or chloroform is usually preferred.

NITZSCH, Friedrich August Berthold, a German theologian, born in Bonn, Feb. 19, 1832. He taught at a gymnasium in Berlin from 1857 to 1868, when he became professor of theology in the university of Giessen. His principal works are: *Das System des Boëthius* (1860); *Augustin's Lehre vom Wunder* (1865); and *Grundriss der christlichen Dogmengeschichte* (3 vols., 1870 et seq.).

NITZSCH, I. Karl Ludwig, a German theologian, born in Wittenberg, Aug. 6, 1751, died there, Dec. 5, 1831. In 1781 he became preacher at Beucha, and in 1790 superintendent general and professor of theology in the university of Wittenberg. He resigned in 1813, and in 1817 was made director of the seminary for preachers in that city. He published *De Revelatione Religionis Externa eademque Publica* (1808); *De Discrimine Revelationis Imperatoris et Didacticæ* (2 vols., 1830); and *Ueber das Heil der Theologie* (1830). **II. Karl Immanuel**, a German theologian, son of the preceding, born at Bornä, Sept. 21, 1787, died in Berlin, Aug. 21, 1868. He received his first education at Wittenberg, studied theology under Schleiermacher, in 1817 became professor in the new theological seminary at Berlin, and

in 1822 professor and university preacher at Bonn. In 1847 he returned to Berlin, where he was made professor, university preacher, and member of the high consistory. Besides many minor treatises, he published *System der christlichen Lehre* (1829; 6th ed., 1851; English translation, Edinburgh, 1849), and *Praktische Theologie* (3 vols., 1847-'67). A volume of his *Gesammelte Abhandlungen* was published at Gotha in 1870. **III. Gregor Wilhelm**, a German philologist, brother of the preceding, born in Wittenberg, Nov. 22, 1790, died in Leipsic, July 22, 1861. He was professor at Kiel from 1827 to 1852, and afterward until his death at Leipsic. He was a leading opponent of F. A. Wolf's theories in regard to the Homeric poems. Among his works are: *Erklärende Anmerkungen zu Homer's Odyssee* (3 vols., 1826-'40); *Præparatio Indaganda per Homeri Odysseam Interpolationis* (1828); *Meletemata de Historia Homeri* (2 vols., 1830-'37); *Die Sagenpoesie der Griechen* (1852); and *Beiträge zur Geschichte der epischen Poesie der Griechen* (1862). **IV. Karl Wilhelm**, a German historian, son of the preceding, born in Zerbst, Dec. 22, 1818. He graduated at the university of Kiel in 1844, became professor there in 1858, and at Königsberg in 1862. His principal works are: *Polybius: zur Geschichte antiker Politik und Historiographie* (Kiel, 1842); *Die Gracchen und ihre nächsten Vorgänger* (Berlin, 1846); *Vorarbeiten zur Geschichte der Staufischen Periode* (Leipsic, 1860); and *Die römische Annalistik von ihren ersten Anfängen bis auf Valerius Antias* (1873).

NIVELLES, or *Nivelle* (Flem. *Nyvel*), a town of Belgium, in the province of Brabant, 17 m. S. of Brussels; pop. in 1866, 9,050. The place is irregularly and poorly built, but there are two pleasant public squares, and several fine

churches and public edifices. The church of St. Gertrude, the crypt of which is noteworthy for its architectural beauty, is a relic of the Benedictine abbey founded here by St. Gertrude, daughter of Pepin of Landen, in 645, around which the town grew up. Its abbess was a princess of the empire till the French revolution, and named the magistrates of the town, which at the beginning of the 15th century had 30,000 inhabitants. On the tower of the church a bronze statue, commonly called "Jean de Nivelles," strikes the hours upon a large bell. This Jean de Nivelles (1422-'77), son of Jean II. de Montmorency, was outlawed in France for joining the duke of Burgundy against Louis XI., and afterward lived here on estates inherited from his mother. He was the progenitor of the line of Montmorency-Nivelles, which, after intermarriage with the counts Horn, succeeded to their estates and name, and included the ancestors of the count Horn afterward famous in the history of the Netherlands. The town has important educational and charitable institutions, and considerable trade in cattle and grain. The French defeated the Austrians at Nivelles in 1794.

NIVERNAIS, an ancient province of France, now comprised in the department of Nièvre. It was situated near the centre of the kingdom, and surrounded by Burgundy, Bourbonnais, Berry, and Orléanais. Its ancient inhabitants were the Ædui and Sequani, and it was afterward subject to the Franks. In the 9th century it became a county, and some of the counts of Nevers bore the title of dukes of Nivernais. The capital was Nevers.

NIZAM, and *Nizam's Dominions*. See HYDERABAD.

NIZHNI NOVGOROD, or *Lower Novgorod*. **I.** A government of central Russia (called also *Nizhe-*



Nizhni Novgorod.

gorod), bordering on Kostroma, Viatka, Kazan, Simbirsk, Penza, Tambov, and Vladimir; area, 19,631 sq. m.; pop. in 1867, 1,262,913,

of whom nearly one third were Tartars, and the remainder chiefly Russians. It is traversed by the Volga, and by its affluents the

Vetluga, Sura, and Oka, and has direct communication by water both with Moscow and St. Petersburg. Steamers proceed by the Volga to Astrakhan, and by the Kama to Perm. The surface is generally level, with a few low hills, nowhere more than 500 ft. high, and composed chiefly of limestone. The N. E. portion, enclosed by the Volga and Vetluga, is covered with forests mostly of fir and birch, and has a sandy and in some places marshy soil. The climate is 10° colder than that of the surrounding country. The habitations are almost wholly confined to a few scattered hamlets. The rest of the government is extremely fertile, and, having a mild climate, produces abundance of grain, hemp, flax, and fruit. The forests yield excellent timber. The mineral productions are iron and gypsum. The principal manufactures are coarse cloth, canvas, cordage, leather, and soap. **II.** A city, capital of the government, on the Volga, where it is joined by the Oka, 250 m. E. by N. of Moscow; pop. in 1867, 40,742. The principal part of the town is built on a steep triangular promontory, about 400 ft. high, between the Volga and Oka, and consists mainly of three handsome streets which radiate from an open space in the centre. At the point of the promontory stands the Kremlin or citadel, defended by a wall 30 ft. high flanked with towers. The chief public buildings, including two cathedrals, a Protestant church, and the governor's palace, are situated within the walls. There are about 60 churches, of which the two cathedrals and the church of the Nativity of the Holy Virgin are the most noteworthy. The houses are mostly of wood, but the shops and warehouses are generally of more substantial materials. The trade, which is at all seasons very extensive, reaches an extraordinary height during the three annual fairs. (See FAIR, vol. vii., p. 59.) A particular quarter is set apart for these great gatherings, and at all other times remains unoccupied.

NOAH, a patriarch in Biblical history, son of the second Lamech, and the tenth in descent from Adam. It is related that he was chosen by the Lord on account of his piety to be the father of the new race of men that should people the earth after the flood. He was warned of the approaching deluge, and built an ark into which he entered, with his family and all kinds of animals. The flood came, and all living things perished save those preserved in the ark. After the waters had subsided and the dry land began to appear, the ark rested on the mountains of Ararat, in Armenia, where Noah offered a sacrifice to the Lord, who accepted it and made a covenant with him, ratifying it by the sign of a rainbow in the clouds. Noah then "began to be a husbandman;" he planted a vineyard, "and he drank of the wine and was drunken, and was uncovered within his tent." His son Ham ridiculed the exposure of his father, but his two other sons, Shem and Japheth, covered him with a garment.

When Noah awoke and knew what had happened to him, he blessed Shem and Japheth, but cursed Canaan, the son of Ham, prophesying of him that he would be a servant of servants to his brethren. There are coincidences between the Biblical history of Noah and the traditions of other nations. (See DELUGE.)

NOAH, Mordecai Mannel, an American journalist, born of Jewish parents in Philadelphia, July 19, 1785, died in New York, March 22, 1851. After attempting some mechanical business, he studied law, and when quite young went to Charleston, S. C., where he soon became known as a local politician. In 1811 he was appointed consul at Riga, and in 1813 consul at Tunis, with a mission to Algiers. The vessel in which he sailed was captured by a British man-of-war, and he was kept a prisoner for several weeks. At length returning to America, he published "Travels in England, France, Spain, and the Barbary States" (New York, 1819). Taking up his residence in New York, he became editor of several newspapers successively established. About 1820 he formed a scheme for a Jewish settlement on Grand island in the Niagara river, where he erected a monument with the inscription: "Ararat, a City of Refuge for the Jews, founded by Mordecai M. Noah in the month of Tishri, 5586 (September, 1825), and in the 50th year of the American independence." This monument, all that ever existed of the city, has disappeared. Mr. Noah held various offices in New York, among which were those of sheriff, judge of the court of sessions, and surveyor of the port. In 1840 a translation of the so-called "Book of Jasher" was published under his direction; and in 1845 he issued a collection of his newspaper essays under the title, "Gleanings from a Gathered Harvest." He also wrote several dramas, which were produced upon the stage with moderate success.

NOAILLES, a French family, called after a village of that name in the ancient province of Limousin and the present department of Corrèze, and which traces its origin to the 10th century. The following are its most celebrated members. **I. Antoine de**, born Sept. 4, 1504, died in Bordeaux, March 11, 1562. He distinguished himself at the battle of Ceresole in 1544, was appointed grand admiral by Henry II. in 1547, and negotiated the truce of Vaucelles in 1556, after having been for three years ambassador in London, where he was succeeded by his brother François (1519-'85). Their joint work, *Négociations en Angleterre*, was published by the abbé Vertot (3 vols., 1763). **II. Anne Jules**, duke de, a descendant of the preceding, and a son of Anne, count and afterward duke de Noailles, born in Paris, Feb. 5, 1650, died in Versailles, Oct. 2, 1708. He was actively employed in the campaigns against Spain (1668) and Holland (1672), where he was aide-de-camp of Louis XIV. He was made governor of Languedoc in 1682, and showed great leniency toward the Calvinists after the

revocation of the edict of Nantes in 1685. In 1689 he commanded the French army in support of the revolted Catalans, and in 1694 defeated the Spanish royalists.

III. Adrien Maurice, duke de, and marshal of France, son of the preceding, born in Paris, Sept. 29, 1678, died there, June 24, 1766. He married a niece of Mme. de Maintenon, served for many years in the army in Spain, and in 1715, on the death of Louis XIV., became a member of the council of regency. As president of the council of finance, he introduced great reforms, compelled the farmers of the public revenue to make restitution of dishonestly acquired funds, and opposed the schemes of John Law, in consequence of which he lost his financial office; and in 1722, through the enmity of Cardinal Dubois, he was dismissed from the council of regency. He resumed military service in 1733, captured Worms, and won the rank of marshal at the siege of Philippsburg (1734). During the war of the Austrian succession he was defeated at Dettingen, in 1743, by George II. of England. As ambassador to Spain in 1746 he effected a reconciliation between the two courts, and subsequently he was a member of the cabinet. His *Mémoires* were published by the abbé Millot in 1777 (6 vols. 12mo).

IV. Louis Marie, viscount de, grandson of the preceding, born in Paris, April 17, 1756, died in Havana in January, 1804. His father was Philippe de Noailles (1715-1794), who became marshal under the title of duke de Mouchy. He fought gallantly in several engagements during the American war of independence, and subsequently espoused the cause of the French revolution of 1789, proposing the renunciation by the nobles of all their feudal privileges. After the flight of Louis XVI. to Varennes he served on the northern frontier, but on the imprisonment of the king he resigned his commission and retired to England. Returning to France after the 18th Brumaire, he was sent as brigadier general to Santo Domingo, and was mortally wounded in capturing an English sloop of war near Havana.

V. Paul, duke de, born in Paris, Jan. 4, 1802. The offspring of a younger branch of the family, he inherited the title of duke from his great-uncle, who died in 1823. He took his seat in the chamber of peers in 1827, and kept it after the revolution of 1830, though an adherent of the exiled Bourbons. In 1848 he retired to private life. In 1849 he was elected to the French academy as successor of Chateaubriand. His principal work is *Histoire de Madame de Maintenon* (4 vols., 1848-58).

VI. Emmanuel Victorien Henri, marquis de, son of the preceding, born at the château of Maintenon, department of Eure-et-Loir, in 1830. He married a Polish lady, and published *La Pologne et ses frontières* (1863), and *Henri de Valois et la Pologne en 1572* (3 vols., 1867), for which the academy gave a prize. He was minister at Washington from July, 1872, to February, 1874, when he was transferred to Rome.

NOBLE. **I.** A S. E. county of Ohio, drained by Wills, Seneca, and Duck creeks; area, about 400 sq. m.; pop. in 1870, 19,949. It has an undulating and hilly surface, and is well timbered and fertile. It contains quarries of building stone and extensive coal mines. The chief productions in 1870 were 179,715 bushels of wheat, 853,950 of Indian corn, 172,210 of oats, 61,771 of potatoes, 19,667 tons of hay, 2,304,557 lbs. of tobacco, 247,534 of wool, 510,963 of butter, and 69,643 gallons of sorghum molasses. There were 7,023 horses, 5,822 milch cows, 9,999 other cattle, 64,229 sheep, and 18,167 swine; 4 flour mills, 6 saw mills, and 6 woollen mills. Capital, Sarahsville. **II.** A N. E. county of Indiana, drained by Elkhart and Tippecanoe rivers; area, 480 sq. m.; pop. in 1870, 20,389. The Grand Rapids and Indiana railroad passes through it. The chief productions in 1870 were 438,075 bushels of wheat, 224,958 of Indian corn, 139,624 of oats, 77,264 of potatoes, 19,171 tons of hay, 107,236 lbs. of wool, 430,240 of butter, and 39,578 of maple sugar. There were 6,067 horses, 5,456 milch cows, 6,625 other cattle, 30,464 sheep, and 14,259 swine; 17 manufactories of carriages and wagons, 7 of furniture, 3 of iron castings, 4 of curried leather, 9 of saddlery and harness, 9 flour mills, 21 saw mills, and 2 woollen mills. Capital, Albion.

NOBLE, Louis Legrand, an American clergyman, born in Otsego co., N. Y., Sept. 26, 1811. He graduated at the Episcopal theological seminary in New York in 1840, and was rector of a parish in North Carolina till 1844, and afterward at Catskill, N. Y. As literary executor of Thomas Cole, he published a memoir of that artist, with selections from his writings (12mo, New York, 1853). In 1854 he took charge of a church in Chicago, in 1858 of one in Jersey City, and in 1874 became professor of the English language and literature at St. Stephen's college on the Hudson, Annandale, N. Y. In 1860 he made an arctic journey with the painter Church, and published "After Icebergs with a Painter" (12mo, 1861). He has also published a number of poems, including "Home," delivered at Trinity college, Hartford, in 1857. Some of his poems have been collected in "The Hours, and other Poems" (1857).

NOBLE, Mark, an English clergyman, born about the middle of the 18th century, died at Barming in Kent, May 26, 1827. In 1784 George III. gave him the living of Barming. He published "Memoirs of the Protectorate House of Cromwell" (Birmingham, 1784; 2d ed., London, 1787); "A Genealogical History of the Royal Families of Europe" (1781); "An Historical Genealogy of the Royal House of Stuart" (1795); "Lives of the English Regicides" (1798); and a continuation of Granger's "Biographical History of England," bringing it down from the revolution to the close of the reign of George I.

NOBLE, Samuel, an English clergyman, born in London, March 4, 1779, died there, Aug. 27,

1853. While an apprentice to an engraver he became acquainted with the writings of Swedenborg, and in 1810 was one of the founders of the London society for printing and publishing them. For 28 years he edited the "Intellectual Repository" while he pursued his profession of engraver. In 1820 he was ordained a minister of the New Jerusalem church, and in 1824 delivered a course of lectures, published under the title of "Plenary Inspiration of the Scriptures" (1828), and subsequently another course of lectures, published as "An Appeal in behalf of the Doctrines of the New Church" (2d ed., 1838). He also published two other volumes of lectures and sermons, and translated Swedenborg's "Heaven and Hell."

NOBLES, a S. W. county of Minnesota, bordering on Iowa, and drained by the head waters of Des Moines, Rock, and Little Sioux rivers; area, 720 sq. m.; pop. in 1870, 117. The surface is rolling and the soil fertile.

NOBUNAGA, a Japanese warrior and legislator, often mentioned in the letters of the Jesuit fathers from Japan, born in 1533, died in 1582. His family name was Ota. He was the lineal descendant of the premier Kiyomori (1117-'81), the head of the Taira clan. Nobunaga's father at his death left him large landed possessions in central Japan. In that period of civil war his ability and vigor quickly gave him preëminence over all other leaders. He first fought on the side of the shogun (of the Ashikaga family), but about 1573 turned his arms against him, captured and deposed him, and thus brought to an end the third line of hereditary military usurpers who had seized the mikado's prerogative and authority. He then governed Japan in the name of the mikado, holding the high office of *naidaijin*. During his lifetime the Portuguese missionaries first entered Japan. Nobunaga, being the fierce enemy of the Buddhist priesthood, encouraged the Jesuits in every possible manner, using them as a counterpoise to the native bonzes, though in his heart he hated both. The Jesuits and native biographers extol his justice and his ability as a statesman and general; but his memory is execrated by the bonzes and Buddhist people. Japanese Buddhism had in his time reached its culmination of power, and the great sects were immensely wealthy, frequently turning the scale of victory by their influence among the people, and the armies they kept in their pay. To destroy their power, and to root up an ever threatening element of disorder and danger, Nobunaga in 1571 attacked the fortified monastery of Hiyeizan, near Kioto, burning the temples, numbering several hundreds, and slaying all the bonzes, with their retainers, concubines, and children by the thousand. For these acts he was lauded by the Portuguese missionaries. He also laid siege to the fortified monastery of Ozaka, which he would have stormed and burned had not the besieged surrendered. Japanese Buddhism has never recovered from this persecu-

tion. A Japanese embassy visited Philip II. and Pope Gregory XIII. during Nobunaga's lifetime. The statement of the Jesuit fathers that he made an image of himself, and caused the people to worship it, is a mistake. In 1582, in the fulness of his power and fame, one of his captains attacked the temple of Honnoji, his residence; and Nobunaga, being wounded, set it on fire, and died by his own hand. He was succeeded by Hideyoshi. (See JAPAN, vol. ix., p. 542.)

NODAWAY, a N. W. county of Missouri, bounded N. by Iowa and W. by the Nodaway river, and drained by the Little Platte and the One Hundred and Two river; area, 710 sq. m.; pop. in 1870, 14,751, of whom 87 were colored. It is intersected by the Kansas City, St. Joseph, and Council Bluffs railroad. The chief productions in 1870 were 46,824 bushels of wheat, 1,276,460 of Indian corn, 122,491 of oats, 66,061 of potatoes, 34,972 lbs. of wool, 203,347 of butter, 15,335 of honey, 22,190 gallons of sorghum molasses, and 18,189 tons of hay. There were 6,715 horses, 1,070 mules and asses, 5,964 milch cows, 10,364 other cattle, 15,661 sheep, and 36,434 swine; 11 manufactories of saddlery and harness, 3 of tin, copper, and sheet-iron ware, 3 of brick and stone, and 11 saw mills. Capital, Maryville.

NODDY, the common name of the birds of the tern family included in the genus *anous* (Leach). The bill is longer than the head, strong, with the culmen curved gradually to the acute tip, and a distinct angle to the lower mandible; wings long and pointed, the first quill the longest; tail long and graduated; tarsi rather short and slender; toes long and united by a full web; hind toe long and slender; claws curved and sharp. The only species on our coast is the *A. stolidus* (Leach), 16



Noddy (*Anous stolidus*).

in. long, with an extent of wings of 32 in., the bill $1\frac{3}{4}$, and the weight $4\frac{1}{2}$ oz.; the front of the head is grayish white, with a black spot over and before the eyes; the rest of the plumage sooty brown, except the primaries and tail, which are brownish black; the bill is black, the iris brown, and the legs and feet dull brownish red. They are found in the gulf of Mexico, and are esteemed as food. They are excellent swimmers and rapid fliers.

NODIER, Charles, a French author, born in Besançon about 1782, died in Paris, Jan. 26, 1844. He published novels and poetry, and was known as a grammarian and a bibliographer. Arrested for a short time on account of a satirical effusion against the first consul, he was afterward professor of literature at Dôle, and at a later period went to Laybach as a librarian of the Bourbon family. In 1824 he became librarian of the Paris arsenal. He published his autobiography (*Souvenirs*) in 1831, and his complete works in 12 vols., 1832-'4.

NOË, Amadée. See CHAM.

NOEL, Baptist Wriothsley, an English clergyman, born in July, 1799, died in London, Jan. 20, 1873. He was a younger brother of the earl of Gainsborough. He was educated at Trinity college, Cambridge, and was one of the chaplains of the queen, and occupied the pulpit of St. John's, Bedford row, London, a proprietary chapel. In 1849 he seceded from the established church, joined the Baptists, and became pastor of John street chapel, where his eloquence attracted large audiences. His "Union of the Church and State" (1849) and writings on baptism have a wide circulation.

NOËTIANS, a heretical sect which originated in the earlier part of the 3d century. Its founder, Noëtus, was a native of Asia Minor, and had embraced the Monarchian doctrine that there is no distinction between the persons of the Godhead. This he made the starting point of his system, saying: "There is one God, the Father, who is invisible when he pleases, and visible when he pleases; but the same, whether visible or invisible, begotten or unbegotten." The Monarchian Praxeas had held that the suffering of the Lord was confined to the human nature, and made a distinction between Christ and Jesus. But Noëtus boldly avowed the doctrine of the Patristians, that the Father suffered in his own person and nature. He was a presbyter at Smyrna, and there declared his doctrine. Being summoned before the synod, he denied or evaded; but afterward, having gained a few adherents, he openly avowed his belief before a second meeting of the synod, and was excommunicated, about the year 230. He then gathered a body of followers, and formed a school for the propagation of his views. Epigonus disseminated the heresy in Rome, where one of his disciples named Cleomenes succeeded in making a convert of the bishop Zephyrinus, who gave a wavering adhesion to the heresy during his long episcopate. The sect had a good number of members, and its doctrines prepared the way for Sabellianism. There seems to have been no attempt to maintain a separate episcopal succession after the death of Zephyrinus.

NÖGGERATH, Jakob, a German geologist, born in Bonn, Oct. 10, 1788. In 1814 he became professor of mineralogy and geology in the university of Bonn. His chief works are: *Das Gebirge in Rheinland-Westphalen* (7 vols.,

Bonn, 1821-'6); *Der Bau der Erdrinde nach dem heutigen Standpunkte der Geognosie* (1838); *Die Entstehung der Erde* (1843); *Die Entstehung und Ausbildung der Erde* (Stuttgart, 1847); and *Die Erdbeben im Rheingebiet in den Jahren 1868-'70* (Bonn, 1870).

NOGRÁD, a county of N. W. Hungary, bordering on Zólyom, Gömör, Heves, Pesth, and Hont; area, 1,685 sq. m.; pop. in 1870, 198,269, consisting of Magyars, Slovaks, and Germans. The N. portion is mountainous and sterile, the S. very fertile. Sheep breeding, the lumber trade, and woollen manufactures are the chief industries. The principal rivers are the Eipel, a tributary of the Danube, and the Zagya, of the Theiss. Capital, Balassa-Gyarmath.

NOIR, Victor, a French journalist, whose real name was Yvan Salmon, born at Attigny, July 27, 1848, killed at Autenil, Jan. 10, 1870. After having been a mechanic and a florist, he became connected with Rochefort's journal, *La Marseillaise*, and was deputed by Paschal Grousset to call upon Prince Pierre Bonaparte to demand reparation for an offensive newspaper article. An altercation ensued, and the prince shot Noir, who died almost instantly. (See BONAPARTE, PIERRE, vol. iii., p. 36.)

NOLA, a city of Italy, in the province of Caserta, 15 m. E. N. E. of Naples, and 7 m. N. of Mt. Vesuvius; pop. about 12,000. It is one of the oldest cities of Campania, and in 327 B. C. sent 2,000 soldiers to the aid of Paleopolis and Neapolis against the Romans, to whom it became subject in 313. Hannibal made three unsuccessful attacks on Nola. It has a museum of antiquities, and the sepulchres here have supplied Etruscan vases to the museums of Europe. The emperor Augustus and his general Marcus Agrippa both died in the town; and it was the birthplace of Giordano Bruno. St. Paulinus was bishop of Nola in the 6th century.

NÖLDEKE, Theodor, a German orientalist, born in Harburg, March 2, 1836, died in January, 1875. He graduated at Göttingen in 1861, and was professor at Kiel from 1864 to 1872, when he was transferred to Strasburg. His principal works are: *Geschichte des Korans* (Göttingen, 1860); *Das Leben Mohammeds* (Hanover, 1863); *Beiträge zur Kenntniss der Poesie der alten Araber* (1864); *Die alttestamentliche Literatur* (Leipzig, 1868); *Grammatik der neusyrischen Sprache* (1868); *Untersuchungen zur Kritik des Alten Testaments* (Kiel, 1869); and *Die Inschrift des Königs Mesa von Moab* (1870).

NOLLEKENS, John, an English sculptor, born in London, Aug. 11, 1737, died there, April 23, 1832. He was the son of an Antwerp painter who settled in London; and he acquired his art in the studio of the sculptor Scheemakers. In 1759-'60 he obtained several prizes from the society of arts, and afterward spent ten years in Rome, returning to London in 1770. He executed portrait busts of many eminent men, several monumental works, and a number of statues of classical subjects, the

best of which is the "Venus combing her Hair." His best known work is the statue of William Pitt at Cambridge. He amassed a fortune of £200,000, and, being childless, bequeathed the greater part of it to his friends Francis Palmer and Francis Douce the antiquary. His life has been written by Allan Cunningham in the "Lives of British Painters, Sculptors, and Architects," and by his pupil J. T. Smith (2 vols., London, 1828).

NOLLE PROSEQUI (Lat., to be unwilling to prosecute), a law term derived, as most law terms are, from those ancient days when all law proceedings and records were in Latin. It meant that the plaintiff declared in court and entered upon the record that he would no longer prosecute his suit. In civil cases, this is superseded in modern times by a nonsuit; but when a plaintiff enters a nonsuit, especially if he does this by order of court, he is still sometimes said to be "nol pros'd." *Nolle prosequi* is very common in criminal cases. It is entered by the officer who acts for the government, when, from insufficiency of evidence or for other reasons, he is unwilling to press the trial any further. He may do this, generally, at any stage of the proceedings. But it puts the defendant, or accused party, to this disadvantage: if he has a verdict in his favor, he cannot be tried again for that offence; but if *nolle prosequi* is entered, he may be indicted and tried again at any time for the same offence. He would prefer therefore a verdict in his favor; but this he ought not to have, if he would escape now by a merely accidental absence of testimony. On the contrary, if it be obvious that he could be fairly tried now, and would probably be acquitted, it would not be just to permit the government to hold this power of accusation and trial over him indefinitely. In some of the states there are statutes, or rules of court, intended to meet this difficulty; and practical mischief seldom arises from it, as a *nolle prosequi* would not be entered by government against the wishes of a defendant, without unquestionable reasons.

NOMENCLATURE, Chemical, the vocabulary of terms used in chemistry. Being the instrument of thought upon chemical subjects, it has necessarily at every period in the history of the science reflected the general intellectual character of the time, as well as the stage of development which chemistry had attained. The crude notion of ancient writers that the heavenly bodies exercised an influence upon terrestrial affairs is expressed in the language of the period by such names as Sol for gold, Luna for silver, Jupiter for tin, Mars for iron, Venus for copper, Saturn for lead; and the progress of the study was greatly retarded by the confused terms then employed. In truth, few events are recorded in the history of chemical science which have exerted a more beneficial influence upon its progress than the adoption of the admirable method of nomenclature brought forward by Guyton de Morveau in 1782, modified

by a committee of the French academy, of which Lavoisier was chairman, in 1787, and published under their auspices in a volume entitled *Méthode de nomenclature chimique* (Paris, 1787). Several chemists had previously perceived the importance of designating compound bodies by the names of their components, and had endeavored to improve upon the indefinite and irrational names adopted by the alchemists; but no satisfactory general system had till then been devised. It should be mentioned at starting that the system of nomenclature here to be described is so intimately connected with certain theoretical views of the constitution of compound bodies, that any treatise upon it must become also in a measure a description of the methods of classification upon which it depends. The main feature of the system consists in forming in a simple and uniform manner the name of any and every compound from the names of the substances of which it is composed. The elements alone are subject to no rule, their names depending entirely upon the choice of the discoverer. It is true that the framers of the nomenclature sought in several instances to express some one prominent property of the element by means of its name, as in the case of oxygen (Gr. *ὀξύς*, acid, and *γεννάειν*, to generate), which was thought to be "a principle necessary to acidity," and hydrogen (Gr. *ὕδωρ*, water, and *γεννάειν*). But these attempts were confined to the elements which at that time had been recently discovered; the common names of all the well known metals, alkalies, &c., having been retained. Of the elements which have since been discovered, some have been named in allusion to striking peculiarities, as chlorine (*χλωρός*, green), iodine (*ἰώδης*, violet), &c. For the most part, however, names devoid of any chemical significance have been chosen, the propriety of which course is now very generally admitted by chemists. In choosing the name of an element, it is important only that it shall be well adapted to the formation of compound names. In accordance with Davy's suggestion, the names of the more recently discovered metals have received a common termination *um*, as potassium, platinum, &c. The idea of applying some one uniform termination to each of the members of a natural group had previously been suggested by Bergman, from whom it was adopted also by the French nomenclaturists, who proposed that the names of metals should all terminate in *e*, as *platine*, *cuivre*, &c. The names of another class of elements terminate in *ine*, as chlorine, iodine, &c.—The elements are divided into two classes, metals and non-metallic bodies (metalloids). The metals all possess certain analogous characteristic properties. The class of metalloids, however, includes several quite distinct groups of elements.—When two elements of unlike properties combine with each other, the product is termed a binary compound. Binary compounds are divided into three great classes, acids, bases, and indif-

ferent bodies. The last have but little chemical activity. Acids and bases, however, possess unlike properties, and, although they do not combine with the elements, still manifest a great disposition to unite one with the other. Ternary compounds, or salts, are thus formed. The resulting salt possesses new properties unlike those of its components, having usually but little affinity for other substances; but some salts can unite with others to form quaternary bodies (double salts). The distinctive properties of these several classes are by no means absolute. Indeed, there are many bodies which, according to circumstances, act either as acids or as bases: as acids when brought in contact with strong bases, and as bases toward strong acids. Those acids which are soluble in water are distinguished by their power of changing the blue color of a solution of litmus to red. Bases, on the contrary, reproduce the blue color of litmus which has been reddened by an acid. The most characteristic salts have but little or no action on red or blue litmus, the acid and basic qualities of their components having been entirely neutralized by combination. There are, however, many exceptions to this, as will be seen further on. When a solution of a salt is subjected to a weak galvanic current, the acid and base of which it consists are separated from each other; the acid collects at the positive pole of the battery, the base at the negative pole. On the theory that like electricities repel, while unlike attract each other, it is evident that the particles of matter which are attracted to the positive pole ought to possess negative electricity, while those attracted to the negative pole should be positively electrified. The base is therefore often called the electro-positive and the acid the electro-negative constituent of the salt. The character of the respective constituents of a salt may hence be exhibited by submitting the latter to the action of galvanism. The same rule applies also to all binary compounds which can be electrolyzed.—In view of the great prominence which oxygen had attained in consequence of the experiments of Lavoisier, and of the fact that most of the acids and bases known to the founders of the chemical nomenclature contained it, or were thought to contain it, as one of their constituents, it is not surprising that especial importance was attached to this element. Indeed, its compounds form the basis of the system. The binary compounds of oxygen are, with the exception of a few indifferent substances, either bases or acids. They are called oxides, the termination *ide*, which is indicative of combination, being added to the first syllable of oxygen. Although the term oxide is generic, and would, strictly speaking, apply with equal force to any compound of oxygen with an element, it is nevertheless usually restricted to those compounds which are destitute of acid properties, viz., to the bases and indifferent bodies. Its acids are

often called oxy-acids. The name of any particular oxide is formed by adding the name of its other element to this generic term; thus, the base formed by the union of oxygen and lead is called oxide of lead, that containing oxygen and potassium, oxide of potassium, &c. Lead and potassium are in these instances electro-positive elements, oxygen being electro-negative in regard to them. As a general rule, the name of the electro-negative constituent of a compound determines its genus, while that of the electro-positive constituent defines the species. The names of the basic compounds which oxygen forms with metals whose names end in *um* are often made to terminate in *a*; thus, instead of oxide of sodium and oxide of barium, the terms soda and baryta are used. Oxide of calcium furnishes the most striking exception to this rule, the common name lime being used instead of calcia. Oxygen usually combines with an element in more than one proportion, forming several bases. To distinguish these, the prefix *proto* (Gr. *πρῶτος*, first) is applied to the oxide in which one equivalent of oxygen is united with one equivalent of the element. An oxide containing less than one equivalent of oxygen to one of the other element is called a sub-oxide (Lat. *sub*, under). The prefix *sesqui* (one and a half) denotes a compound in which the oxygen is to the other element in the ratio of 3 to 2; *deuto* (Gr. *δεύτερος*, second) or *bin* (Lat. *bini*, two), an oxide containing two equivalents of oxygen; and *trito* (Gr. *τρίτος*, third) or *ter* (Lat. *terni*, three), an oxide containing three equivalents of oxygen to one of the other element. The base containing the largest amount of oxygen is often called the peroxide (*per*, thorough). Thus, three compounds of the metal manganese and oxygen are distinguished as follows:

Protoxide of manganese contains	{ 1 eq. of manganese, 1 eq. of oxygen.
Sesquioxide of " "	{ 2 eqs. of manganese, 3 eqs. of oxygen.
Bin-, deut-, or per- } oxide of " "	{ 1 eq. of manganese, 2 eqs. of oxygen.

At the time when the nomenclature was framed, it was believed that only two acid compounds could be formed by the combination of oxygen with another element. These were distinguished from each other by causing the name of the other element to terminate in *ic* for the combination containing the larger proportion of oxygen, and in *ous* for the compound containing less oxygen, the word acid being added in each case to the words thus formed. For example, two compounds of sulphur and oxygen are respectively:

Sulphurous acid, composed of	{ 1 eq. of sulphur, 2 eqs. of oxygen.
Sulphuric acid, " "	{ 1 eq. of sulphur, 3 eqs. of oxygen.

Of the compounds which an element may form with oxygen, those containing the larger num-

ber of equivalents of the latter are usually acids; those containing but few equivalents of oxygen are bases; while not unfrequently the intermediate degrees of oxidation are indifferent bodies. Thus, of the oxides of manganese just referred to, the proto- and sesquioxides are bases, and the bin- (or per-) oxide is an indifferent body; there are also two compounds containing more oxygen which are acids, viz.:

Manganic acid, containing	{ 1 eq. of manganese, 3 eqs. of oxygen.
Permanganic acid, "	{ 2 eqs. of manganese, 7 eqs. of oxygen.

The compounds which oxygen forms with the metals are, however, for the most part bases, those with the metalloids acids.—Many of the binary compounds of sulphur are analogous to those of oxygen. They are termed sulphides, and as a rule correspond with the oxides. Like the latter, they may be classed as acids, bases, and indifferent bodies. Members of the first two classes, like the oxyacids and bases, unite with each other to form sulpho-salts. They have, however, comparatively little affinity for the other elements, or for compounds not containing sulphur. The sulphur bases and the indifferent sulphides are distinguished by the same prefixes as the oxides. Thus, the three sulphides of iron are termed respectively: protosulphide of iron, symbol FeS ; sesquisulphide of iron, Fe_2S_3 ; and persulphide of iron, FeS_2 . The sulphur acids are named by prefixing the term *sulpho* to the name of the corresponding oxygen acid; thus, the compound of carbon and sulphur analogous to carbonic acid is called sulpho-carbonic acid. The binary compounds of chlorine and of several other elements are named in a similar manner. Thus, with the other elements, oxygen forms oxides; sulphur, sulphides (sulphurets); chlorine, chlorides; bromine, bromides; iodine, iodides; fluorine, fluorides; phosphorus, phosphides (phosphurets); carbon, carbides (carburets); nitrogen, nitrides, &c. When several chlorides, bromides, iodides, or fluorides of any one metal occur, they are distinguished by the same prefixes as the oxides. The binary compounds of these elements are, however, usually regarded, not as acids and bases, but, like the ternary oxygen compounds, as salts. This exception is one of the fruits of the too hasty assumption by the founders of the nomenclature, that oxygen was the universal acidifying principle; an error which lies at the basis of their system, and constitutes one of its greatest faults. It has since been ascertained that the metalloids in question, as well as some others, by uniting with hydrogen, form acids as energetic and as well characterized in every respect as the oxy-acids; for example, chloride of hydrogen, fluoride of hydrogen, &c. These are called hydracids. Instead of being written out in full, as they have just been given, the names of these compounds are formed by fusing to-

gether those of their constituents, as chlorhydric acid, fluorhydric acid, &c. The synonymous names, as hydrochloric and hydrofluoric acids, are still often used, but are not in accordance with the general principle that the name of a compound must commence with that of its electro-negative component; their inaccuracy was pointed out simultaneously by Thénard and Dr. Hare of Philadelphia. The hydracids are capable of uniting directly with basic oxides or with metals, with separation of hydrogen in either case; in the first instance the hydrogen unites with the oxygen of the metallic oxide to form water, in the latter it is evolved as gas. The compounds thus formed were at first thought to contain oxygen, the hydracids being supposed to be oxygenated, and were admitted as salts without question; indeed, one of them, common sea salt, is that from which the very idea of a salt was originally derived. An attempt has since been made to refer them to the oxygen class by supposing that they constitute when in solution, not simple binaries, but compounds of the original undivided hydracid with an oxide. Thus the compound of chlorine and sodium (common salt) was at one time often called chlorhydrate (or hydrochlorate) of soda; it being claimed that the elements of an equivalent of water had united with its constituents to form chlorhydric acid and oxide of sodium (soda). From this (conventionally admitted) property of chlorine, and the metalloids allied to it, to form salts by direct combination with metals, they have been termed halogens (salt producers; Gr. *ἅλς*, [sea] salt, and *γεννάειν*), and their salts have been called haloid (from *ἅλς* and *εἶδος*, in the likeness of) to distinguish them from the oxygen salts.—The names of ternary compounds or salts, in the original acceptance of the term, are formed by combining the names of the acid and base of which they are composed, the name of the acid or electro-negative component supplying the generic, the base or electro-positive compound the specific name. If the name of the acid terminates in *ic*, this termination is changed into *ate*; if in *ous*, into *ite*; and to the words thus formed the name of the base is added. For example, sulphuric acid and oxide of lead form sulphate of the oxide of lead; sulphurous acid forms a sulphite of the same oxide; while hyposulphurous acid produces a hyposulphite, and hyposulphuric acid a hyposulphate. In like manner the compounds of nitric acid are nitrates, and those of nitrous acid nitrites of the bases with which they may be combined. When a salt contains as its base the oxide of a metal which forms but one well defined base with oxygen, its name is usually shortened by leaving out the words "of the oxide," which are always understood. Thus, it is customary to say sulphate of lead, instead of sulphate of the oxide of lead; nitrate of potassa, instead of nitrate of the oxide of potassium. In case more than one basic oxide of the same element is capable of

combining with acids, the distinguishing prefix of each is retained in the name of its salts; as sulphate of protoxide of iron, and sulphate of sesquioxide of iron. These salts are also often called respectively protosulphate and persulphate of iron, the prefixes being understood to refer to the degrees of oxidation of the metal. As the number of salifiable oxides of any element is rarely if ever greater than two, it was proposed by Berzelius to distinguish them in some cases, like the acids, by the terminations *ous* and *ic*. The two oxides of iron he called ferrous oxide and ferric oxide respectively, and the salts just mentioned ferrous and ferric sulphate; and so with the oxides of various other metals. These changes are very convenient in certain cases, and for these they have been extensively adopted.—It often happens that an acid can combine with the same base in several different proportions. Of the salts thus formed, one is called neutral, or more properly normal, since the definition now depends upon some one constant relation in which the oxygen of the acid stands to that of the base for the salts of each individual acid; those containing more base than this are termed basic, and those containing less, acid salts. The term neutral or normal is not usually expressed, being understood to belong to any salt which is characterized neither as basic nor as acid. When several acid salts of any one base occur, they are distinguished from each other by the Latin prefixes *bi*, *ter*, &c., which are attached to the name of the acid; thus, monochromate (or simply chromate), bichromate, and terchromate of potassa. When several basic or sub-salts occur, they are usually distinguished by prefixing the terms bibasic, sesquibasic, terbasic, &c., to the name of the salt. Thus, five acetates of lead are known: monobasic (or normal) acetate of lead, symbol $\text{PbO} \bar{\text{A}}$; bibasic do., $(\text{PbO})_2 \bar{\text{A}}$; sesquibasic do., $(\text{PbO})_3 \bar{\text{A}}$; terbasic do., $(\text{PbO})_4 \bar{\text{A}}$; sexbasic do., $(\text{PbO})_6 \bar{\text{A}}$. It has also been proposed to denote the amount of base in a sub-salt by prefixing to its name the Greek numerals *dis* (twice), *tris* (thrice), *tetrakis* (four times), &c., in contradistinction to the Latin ones used for acid salts. Thus, instead of bibasic acetate of lead, the term diacetate of lead would be used; instead of terbasic acetate of lead, triacetate of lead, and so on. Many oxides act as bases under certain circumstances, and as acids under others; they may have therefore two different names. Thus, the oxide of aluminum when acting as a base is called sesquioxide of aluminum (or alumina); but when playing the part of an acid, it is termed aluminic acid. Water (protoxide of hydrogen) is another oxide which is either acid or basic according to circumstances; when it plays the part of an acid its salts are termed hydrates, as hydrate of potassa, &c. The principles of the nomenclature have not been carried out, however, in regard to the compounds in which it acts as a base. Several of our most common

acids are such compounds; but instead of saying sulphate of water, nitrate of water, &c., they are termed hydrated sulphuric acid, hydrated nitric acid, &c.; or, oftener, simply sulphuric or nitric acid, terms which ought, strictly speaking, to be applied only to the anhydrous compounds. In like manner certain salts, which contain two equivalents of acid united with one equivalent of a metallic base and one equivalent of water, which ought to be regarded as double salts, are named as if they were bisalts, containing two equivalents of acid to only one of base, the water being left out of account. Thus the compound of one equivalent of water, one equivalent of potassa, and two equivalents of sulphuric acid, is commonly called bisulphate of potassa.—The names of some of the ternary sulphur compounds (sulphur salts) are formed in a similar manner to those of the corresponding compounds of oxygen; thus the compound of sulphide of sodium and sulphantimonic acid is called sulphantimoniate of the sulphide of sodium. Like the names of the oxygen salts, these are usually abbreviated. In the instance cited, the salt is commonly termed sulphantimoniate of sodium, it being understood that the latter element is united with sulphur. But this system is limited to only a few of the sulphur acids; the terms sulpharseniate, sulphantimoniate, and sulphomolybdate are well understood; but the sulphophosphates, for example, of Berzelius (MS , PS_5) have never been generally so called.—So long as the attention of chemists was principally directed to the consideration of inorganic compounds, the system of nomenclature just described, in spite of its numerous faults and inconsistencies, was found to be sufficiently expansive to meet all requirements. It has, however, failed to furnish suitable names for many new classes of compounds which have recently been discovered. This is especially true of the great variety of organic substances, with the study of which chemists of the present day are chiefly occupied. But the radical fault of the system is its intimate connection with the so-called dualistic theory as just developed, which supposes all compounds to be capable of division into two prime factors, as salts into acids and bases, and these into still simpler antagonistic components; a view which is at present generally discarded. The system of nomenclature in question has moreover been found to be incapable of expressing innumerable decompositions and changes which occur among complex substances. But this difficulty has been in a measure obviated by the introduction of certain written abbreviations (see SYMBOLS, CHEMICAL) and formulas, which exhibit at once to the eye the composition of bodies and the alterations to which they are subject. Indeed, since the adoption of these symbols the name of a substance is of comparatively little scientific importance. The introduction of many names synonymous with those now used

has thus been unquestionably prevented, and numerous other alterations obviated. There is a numerous class of compounds termed compound radicles which, though they contain several elements, nevertheless comport themselves like simple substances toward the elements. For example, cyanogen, a compound of two equivalents of carbon and one equivalent of nitrogen, exhibits properties closely analogous to those of the element chlorine. In general the term radicle is applied to any substance which by uniting with an element can give rise to an acid or a base. Many of the more simple compounds formed by the union of compound radicles with elements or with other compound radicles are classed with the chlorine salts; as cyanide of potassium, chloride of ethyl, &c., the radicle ethyl being composed of four equivalents of carbon and five of hydrogen. Some of the compound radicles acting as metals can unite with oxygen to form bases or acids, which, when combined with each other, produce salts which are completely analogous to the oxygen salts of inorganic chemistry. Thus the radicles ethyl and benzoyl, after combination with oxygen, are respectively a base and an acid, which by uniting form benzoate of the oxide of ethyl (benzoate of ethyl). In general terms it may be said that the nomenclature of organic acids, bases, and salts is similar to that of analogous inorganic substances. It is among the radicles themselves, and the numerous neutral or indifferent complex bodies of organic chemistry, that the system is at fault. Organic compounds are usually divided into natural families or groups, the generic names of which are furnished in each case by the name of some one substance which happens to be familiarly known, and to which each member of the group is in some way allied. Thus the term alcohol is applied to a large class of bodies analogous to common alcohol, each separate member of the class being designated by prefixing its specific name; as methyl alcohol (wood spirit), ethyl alcohol (common alcohol), &c. In like manner ether is the generic name of a large class of bodies of which common ether is the type. In compounds produced by substitution (see CHEMISTRY), that is, in those cases where one or more of the equivalents of an element are replaced in a compound by equivalents of other elements or of compound radicles, names are formed by prefixing to the name of the original compound that of the element or elements which have been newly introduced. The prefixes *bi*, *ter*, &c., or *di*, *tris*, *tetra*, &c., if the replacing substances possess basic properties, are used to denote those cases where two or more equivalents of any one element are substituted. Thus, acetic acid in which one equivalent of hydrogen has been replaced by an equivalent of chlorine is called chlor-acetic acid (or monochloracetic acid); when three equivalents of hydrogen are thus replaced, it is called terchloracetic acid. When

one equivalent of hydrogen in ammonia is replaced by ethyl, the resulting compound is called ethyl-ammonia, or shortly, ethylamine; when two equivalents of hydrogen are thus replaced, it becomes diethyl-ammonia (diethylamine), and so on. But each of the three equivalents of hydrogen in ammonia may be replaced by separate radicles, as in ethyl-methyl-amyl-ammonia. In similar cases exceedingly complicated names are often unavoidable; but such are rarely expressed without their written formulas.—Two or three common prefixes, besides those already mentioned, occur. Thus, *pyro* (abbreviated by Guyton de Morveau from the term *empyreumatic*, much used by the alchemists) is a distinguishing appellation of many acids obtained by means of dry distillation, as pyrogallie acid, &c. *Para* (Gr. *παρά*, near to) was proposed by Berzelius to indicate a strong resemblance between two compounds, as tartaric and paratartaric acids, which, though very much alike, must nevertheless be regarded as distinct substances. *Meta* (Gr. *μετά*, signifying change) is also used in a somewhat similar manner. Thus, when aldehyde is kept for a long time in a close tube, it gradually changes into two compounds, both isomeric with the original substance; one of these is called metaldehyde, and the other paraldehyde.—Many chemists have sought to apply names terminating alike to all the members of a given class. Although it is not easy to carry out this principle in detail, it has nevertheless been successfully applied to the names of several classes of compound radicles which terminate in *yle*, or simply *yl*, as ethyl, methyl, &c. The names of the alkaloids also, and in general of bases which are not radicles like ethyl, terminate in *ine*, as strychnine, morphine, and the like.—In the above sketch we have given the nomenclature employed during the last 75 years in the best treatises on technology, and analytical, physiological, pharmaceutical, and general chemistry. But as language is the instrument used to express the existing knowledge on any subject, and as the domain of science has been immensely increased and the theoretical views entertained by chemists have been materially modified, a new nomenclature has been found necessary. It would be impossible to notice in this place the various systems of nomenclature devised as substitutes for the language invented by Lavoisier. One of them, proposed by Prof. Samuel D. Tillman of New York, displayed great ingenuity and a rare adaptation to the progress of chemical science; but as it has not been generally adopted, an analysis of it would be out of place. A greater change has taken place in the notation than in the nomenclature of modern chemistry. Many of the atomic weights have been doubled; graphic formulas for the expression of the molecular constitution and of the doctrine of substitution in organic chemistry have been found necessary; and the student of the present day is

compelled to learn two sets of figures, the dualistic of Berzelius and the unitary of modern times. The departures from traditional English usage in the names of compounds are made to correspond with the changes in notation, and are chiefly verbal. A few illustrations will suffice to make this point clear :

OLD.	NEW.
Carbonate of potash.	Potassium carbonate.
Bicarbonate of potash.	Hydrogen potassium carb'ate.
Sulphate of zinc.	Zinc sulphate.
Protosulphate of iron.	Ferrous sulphate.
Persulphate of iron.	Ferric sulphate.
Anhydrous sulphuric acid.	Sulphuric anhydride.
Carbonic acid.	Carbon dioxide.

In the case of the complicated bodies belonging to organic chemistry, the assumption of compound radicles and other peculiar views of rational constitution have led chemistry to construct various new names, which are to be learned in the writings where they are propounded. Atomicity is a term much employed by modern chemists to denote the equivalent value or combining capacity of an element. It is measured by the number of atoms of hydrogen or other monatomic or univalent element with which the element in question can combine. When an element does not unite with hydrogen, as in the case of many of the metals, its atomicity may be measured by the number of atoms of chlorine, bromine, or iodine with which it can combine, since the atomicity of the elements is equal to that of hydrogen. The atomicity or combining capacity is in most cases a variable quality; and chemists have found it convenient to divide the elements into two classes, one of odd, the other of even equivalence. Those of odd equivalence are called *perissads*, those of even equivalence *artiads*; *e. g.*: perissads—nitrogen, phosphorus, arsenic, antimony, gold; artiads—oxygen, sulphur, selenium, tellurium, barium, calcium, magnesium, tin, &c. The fact that the older nomenclature has been so long in use among chemists, pharmacists, physicians, and manufacturers, and that so vast a mass of literature has been written in accordance with it, has made scientific men very reluctant to abandon it. But the new facts and theories continually brought forward as the science advances require a change in classification and language; and the greater truth of modern chemistry must ultimately compel the adoption of the new notation and nomenclature.

NOMINALISM. See PHILOSOPHY.

NONCONFORMISTS, a name sometimes given to dissenters from the church of England, but more particularly applied to the clergymen who gave up their livings on the passage of the act of uniformity in 1662. An act of uniformity was passed in 1558, but was only partially enforced for seven years, most of those who refused to conform to the ceremonies of the church still remaining within it. At the first convocation of the clergy in 1561, a motion to

do away with the ceremonies objectionable to the Puritans was lost by a majority of one only; and this rejection was due to the strong influence of Queen Elizabeth and the primate, and to the fear that the change would relieve Roman Catholic nonconformists as well as Protestants. In 1565 the law began to be more rigidly enforced, and many nonconformists were deprived of their preferments, and many were imprisoned. In 1593 an act was passed to enforce conformity of the laity, requiring attendance at the parish church of all persons over 16 years of age, upon pain of banishment, and of death for continued disobedience. James I., though educated a Presbyterian, enforced the laws against nonconformity with great severity, and his policy was adhered to by Charles I. Under the protectorate the nonconformists enjoyed the right of worship without molestation, and Episcopacy in its turn was proscribed. The restoration witnessed the reestablishment of the old church polity, and the revival of the penal laws against the dissenters. A new act of uniformity was passed in 1662, restoring all the ancient forms and ceremonies of the established church, and requiring that every benefited minister, every fellow of a college, and even every schoolmaster, should declare his assent to all and everything contained in the "Book of Common Prayer," and that no one should hold any preferment without episcopal ordination. For their unwillingness to conform to the requirements of this act, 2,000 clergymen were obliged to give up their livings, and it was at this time that the title of nonconformists came into use. The "Declaration of Indulgence" of James II. afforded a temporary relief to the nonconformists; but it was not until the reign of William and Mary that they enjoyed real toleration, and even from this those who denied the Trinity were excepted. (See DISSENTERS.)

NONSUIT (L. Fr. *nonsue*, *non suist*, modern Fr. *non suit*, Lat. *non sequitur*, he does not pursue), in law, a judgment given against a plaintiff in default of evidence, or for neglect to proceed with a cause after it has been put at issue. A plaintiff may find after commencing his action that he cannot maintain it for want of evidence. In order therefore to prevent a verdict and judgment which will be not only probably unfavorable to him, but also a bar to further process upon the same cause of action, he may abandon his suit and defer its complete prosecution until he is prepared with fuller testimony; in other words, he becomes nonsuit. This he may do at any time before verdict, unless an exercise of his right will wrong the defendant. If he fails to appear for the trial of his cause, the crier usually in open court calls upon him to come in and prosecute it; and if he does not, he is noted upon the docket as nonsuit, the action is at an end, and the defendant recovers his costs against him. If the plaintiff has once appeared, it seems to be the English rule, and that of many of the

United States, that he cannot be nonsuited except by his own consent, provided he has offered pertinent, even though it was the slightest, evidence in support of his claims. In some of the states, however, where this rule is maintained, the presiding judge recommends a nonsuit subject to the opinion of the full court. But in New York and other states, it is held to be within the power, and even duty, of the court to nonsuit the plaintiff, if in its opinion the testimony which he has offered will not authorize the jury to find a verdict for him, or if the court would set aside such a verdict as being contrary to the evidence. Yet in such a case of involuntary nonsuit the plaintiff may, upon a case made or upon a bill of exceptions, move to have the nonsuit set aside.—A nonsuit is a mere default. It does not, like judgment following upon a verdict, change the face of the matter in controversy. It leaves the parties in the same position toward each other as if no action had been brought. In submitting to it, the plaintiff does not admit that he has no cause of action; and, subject only to the probable order of court that further proceedings be stayed until the costs of the former suit are paid, the plaintiff is entitled to institute a new action at his pleasure.

NOOTKA SOUND, an inlet on the W. coast of Vancouver island, British North America, in lat. $49^{\circ} 35' N.$, lon. $126^{\circ} 35' W.$ It extends 10 m. in a N. N. E. direction, and forms a number of smaller bays and coves. In the middle is a large wooded island, and the greatest breadth of water is not more than 500 yards. The shores are rocky, and the anchorage good. The sound was discovered by Capt. Cook in 1778, and in 1780 a British fur station was established there. In 1789 the Spanish captured two British vessels and took possession of the settlement; but in 1791 the British right to the sound and territory was recognized, and in April, 1792, Vancouver was sent there to receive the restitution.

NOOTKAS, or **Ahts**, a family of tribes on Vancouver island and the mainland near it, embracing the Ahts proper (of whom the Moouchaht are the tribe called Nootkas by Capt. Cook and others since), on the W. side of the island, numbering 3,500; the Quackewlth, embracing 16 or 17 tribes on the W. and E. sides of the island and on the mainland, also estimated at 3,500; and the Cowichans on the E. side of the island, numbering 7,000. The Ahts proper revere Quawteah as their deity and progenitor, worship the sun and moon, and believe in a mighty supernatural bird, Totooch. They are divided into clans, and a man cannot marry in his own, or invite men of his own clan to a feast; children belong to the mother's clan. They build houses 40 by 100 ft., having a row of posts in the middle and at each side with string pieces on them. These are permanent, but the cedar slabs and mats covering the sides and roof are carried as they move from one fishing station to another, laid across two canoes. Their ca-

noes are long dugouts, and they are expert fishers, taking salmon, herring, halibut, and whales; they also hunt, and gather for food shell fish, seaweed, and camash roots. They make blankets of cypress bark, rain capes of white pine bark, curious hats of cedar and pine bark, and wooden dishes, dippers, and boxes; they carve the posts of their houses, and wooden masks used in war and in their dances. They hang up their dead chiefs and children in boxes or canoes in trees, or sometimes lay them on the ground and heap sticks and stones over them. Burial is more rare. The Ahts are cruel and treacherous, and have frequently destroyed vessels, besides constantly killing traders, thus provoking repeated chastisements from the whites. The Cowichans, though allied to the Ahts, are semi-civilized, readily adopt the ways of the whites, and both men and women prove useful to the settlers as servants and laborers; and they have made some progress in agriculture. Among these tribes Protestant and Catholic missionaries have found encouragement. The most extended Aht vocabulary is in Sproat's "Scenes and Studies of Savage Life" (London, 1868).

NORD, Le, the northernmost department of France, formed chiefly from the old province of Flanders, bordering on the North sea, Belgium, and the departments of Ardennes, Aisne, Somme, and Pas-de-Calais; area, 2,193 sq. m.; pop. in 1872, 1,447,764. The coast line is formed by a ridge of sand hillocks, and has two harbors, Dunkirk and Gravelines. The principal rivers are the Sambre, Scheldt, Scarpe, Lys, and Yser, which have been rendered navigable, and are connected with one another by 25 canals. The surface is flat, except in the south, where there are some low detached hills. The greater part of the soil is a rich alluvium. Coal is found in several places. Linen, woollen goods, and cottons are manufactured; and there are iron works, foundries, and glass works. The climate is damp, and not considered healthy. It is divided into the arrondissements of Avesnes, Cambrai, Douai, Dunkirk, Hazebrouck, Lille, and Valenciennes. Capital, Lille.

NORDENSKJÖLD, **Adolf Erik**, a Swedish explorer, born in Helsingfors, Nov. 18, 1832. In 1858 he became professor of mineralogy in Stockholm, and between 1859 and 1868 took part in four arctic expeditions, the most important of which, in 1868, resulted in thoroughly ascertaining the situation of Spitzbergen. From 1870 to 1872 he was a member of the second Swedish chamber, and during the summer of 1870 he explored Greenland, going further into the interior than any previous scientific traveller. He has written narratives of his third arctic expedition of 1864, and of his Greenland expedition of 1870. In July, 1872, he was placed in command of an antarctic expedition.

NORDHAUSEN, a town of Prussia, in the province of Saxony, 38 m. N. W. of Erfurt, at

the S. extremity of the Hartz mountains; pop. in 1871, 21,273. It consists of an old or upper town, a new or lower town, and several suburbs. The first is situated on a hill, and contains the town hall, the market, and the principal churches. There are seven Protestant churches and a Roman Catholic cathedral. In the church of St. Blasius are two famous paintings by Lucas Cranach. Nordhausen contains over 50 brandy distilleries and many breweries. The fattening of cattle is a prominent industry, and the town is the centre of the corn trade of the region. Near it are the castles of Hohenstein and Ebersburg.—The wife of the emperor Otho I. founded a monastery here in the 10th century. Several diets were held here in the 11th and 12th centuries, and in the 13th Nordhausen became an imperial city, belonging to the circle of Lower Saxony. In 1802 it was allotted to Prussia; in 1807 it formed part of the kingdom of Westphalia, but was restored to Prussia in 1813.

NORDHOFF, Charles, an American author, born at Erwitte, Westphalia, Prussia, Aug. 31, 1830. In 1835 he came with his parents to the United States, and went to school in Cincinnati, where at the age of 13 he was apprenticed to a printer. In 1844 he went to Philadelphia, where, after working in a newspaper office, he shipped in the United States navy, and served three years, making a voyage around the world. He remained at sea in the merchant, whaling, and mackerel fishery service till 1853, when he again found employment in a Philadelphia newspaper office, and afterward in Indianapolis. From 1857 to 1861 he was editorially employed by Harper and brothers in New York; from 1861 to 1871 he was on the staff of the New York "Evening Post." He visited California in 1871-'2, and again in 1872-'3, when he extended his travels to the Hawaiian islands. He has published "Man-of-War Life," "The Merchant Vessel," and "Whaling and Fishing" (Cincinnati, 1856); "Stories of the Island World" (New York, 1858); "Secession is Rebellion: the Union Indissoluble" (1860); "The Freedmen of South Carolina: some Account of their Appearance, Character, Condition, and Customs" (1863); "America for Free Working Men" (1865); "Cape Cod and All Along Shore: a Collection of Stories" (1868); "California for Health, Pleasure, and Residence" (1872); "Northern California, Oregon, and the Sandwich Islands" (1874); "Politics for Young Americans" (1875); and "The Communistic Societies of the United States" (1875).

NÖRDLINGEN, a fortified town of Bavaria, in the district of Swabia and Neuburg, 38 m. N. W. of Augsburg; pop. in 1871, 7,081. It is surrounded by walls with towers at intervals, contains a handsome Gothic church of the 16th century, a Latin school, an orphan asylum, and manufactories of linens, woollens, carpets, and leather. On Sept. 6, 1634, a Swedish army under Gen. Horn and Bernard of Weimar was

totally defeated here by the imperialists, commanded by Ferdinand, the emperor's son, and the generals Gallas and Piccolomini. Horn was among the captives. In 1645 the imperialists were in their turn defeated here by the French under Turenne. In 1647 the town was bombarded and partly burned by the Bavarians. Battles between the French and Austrians were also fought here in 1796 and 1800. Nördlingen was a free imperial city till 1802, when it was annexed to Bavaria.

NORE. See THAMES.

NORFOLK. I. An E. county of Massachusetts, having Massachusetts bay on the N. E. and Rhode Island on the S. W.; area estimated at 450 sq. m.; pop. in 1870, 89,444. It is watered by the Charles, Neponset, and other rivers. The surface is rough, and in some places hilly, and the soil is strong and rocky and highly cultivated. Granite of an excellent quality is quarried at Quincy. It is traversed by several railroads terminating in Boston. The chief productions in 1870 were 6,717 bushels of wheat, 46,136 of Indian corn, 7,734 of oats, 6,728 of barley, 132,734 of potatoes, 24,920 tons of hay, and 170,295 lbs. of butter. There were 2,070 horses, 5,289 milch cows, 2,303 other cattle, 508 sheep, and 3,233 swine. The number of manufacturing establishments was 658, with a capital of \$9,548,750; annual products, \$25,836,394. The principal manufactures were 14 of boot and shoe findings, 11 of packing boxes, 16 of carriages and wagons, 1 of chocolate, 1 of copper bolts and sheathing, 10 of cotton goods, 1 of fertilizers, 1 of flax and linen goods, 8 of furniture, 7 of hardware, 17 of hosiery, 4 of India-rubber and elastic goods, 4 of forged and rolled iron, 6 of castings, 18 of leather, 7 of machinery, 9 of paper, 19 of saddlery and harness, 2 of sewing and twist silk, 14 of straw goods, 15 of tin, copper, and sheet-iron ware, 11 of woollen goods, 9 flour mills, and 9 saw mills. Capital, Dedham.

II. A S. E. county of Virginia, bordering on North Carolina, having the mouth of James river or Hampton roads on the N. and Chesapeake bay on the N. E. corner, and drained by Elizabeth and North rivers; area, about 500 sq. m.; pop. in 1870, 46,702, of whom 22,320 were colored. It has a level surface, and comprises a large portion of the Dismal swamp. The Atlantic, Mississippi, and Ohio railroad terminates at Norfolk; and it is traversed by the Seaboard and Roanoke railroad and the Dismal Swamp canal. The chief productions in 1870 were 348,821 bushels of Indian corn, 13,614 of peas and beans, 69,212 of Irish and 43,913 of sweet potatoes. There were 1,028 horses, 1,144 milch cows, 1,678 other cattle, 619 sheep, and 7,643 swine; 4 manufactories of carriages and wagons, 1 of railroad cars, 1 of iron castings, 4 of machinery, 8 of tin, copper, and sheet-iron ware, 3 flour mills, 4 saw mills, and 3 ship yards. Capital, Portsmouth.

NORFOLK, a S. county of Ontario, Canada, on the N. shore of Lake Erie; area, 635 sq.

m.; pop. in 1871, 30,760, of whom 13,039 were of English, 5,384 of German, 5,280 of Irish, 3,779 of Scotch, 1,781 of Dutch, and 687 of French origin or descent. It is watered by several streams, and is traversed by the Canada Southern and Canada Air Line railroads. The surface is undulating and the soil fertile. Capital, Simcoe.

NORFOLK, a maritime county of England, bordering on the North sea, the counties of Suffolk, Cambridge, and Lincoln, and the Wash; area, 2,116 sq. m.; pop. in 1871, 438,511. The coast consists of cliffs, partly chalk, which the sea is gradually undermining, and several villages have been swept away. The surface is flat, except in the north. The soil is light, and there is little woodland, but agriculture is very advanced. The principal rivers are the Great and Little Ouse, Nen, and Yare. The climate on the E. coast is dry, and in winter and early spring cold penetrating winds prevail. The best crop is barley, which is made into malt and exported. Turnips are extensively raised. The stock of sheep is considerable, much poultry is raised for the London market, and game abounds. There are valuable fisheries of herrings and to some extent of mackerel. Woolen manufactures are largely carried on. The principal towns are Norwich, the capital, Lynn Regis, Thetford, and Yarmouth.

NORFOLK, a city and port of entry of Norfolk co., Virginia, on the N. bank of Elizabeth river, 8 m. from Hampton roads, 32 m. from the Atlantic ocean, and at the terminus of the At-

lantic, Mississippi, and Ohio railroad, 88 m. in a direct line and 160 by water S. E. of Richmond; pop. in 1850, 14,326; in 1860, 14,620; in 1870, 19,229, of whom 8,766 were colored. Its situation is low. The streets are generally wide, but irregularly laid out, and the houses well built of brick and stone. Among the principal buildings are the city hall, having a granite front and a cupola 110 ft. high, the Norfolk academy, mechanics' hall, and masonic temple. There are two cemeteries handsomely laid out and adorned with cypress trees. The city contains a court house, jail, and custom house. The custom house and the buildings of several of the banks are elegant structures. It has a fine harbor, easily accessible and safe, admitting the largest vessels. The entrance is defended by Forts Calhoun and Monroe. In the vicinity, at Gosport, is a United States navy yard with a marine hospital. The yard contains a dry dock, constructed of granite, at a cost of \$974,536. The trade of Norfolk is facilitated by three canals: the Norfolk and Princess Anne canal; the Dismal Swamp canal, passing through Dismal swamp from Elizabeth river to Pasquotank river; and the Albemarle and Chesapeake canal, connecting Chesapeake bay with Currituck, Albemarle, and Pamlico sounds. The last is navigable by vessels of 500 tons, and steam is exclusively used for towing and transportation. The receipts of cotton in 1872-'3 were 405,412 bales; in 1873-'4, 467,571. The value of imports into the customs district, which includes Portsmouth, for



Norfolk.

the year 1874, was \$45,209; of exports, \$3,906,318; clearances for foreign ports, 96, tonnage 50,698; coastwise clearances, 1,183, tonnage 1,119,029; belonging in the district on June 30, 376 vessels, of 12,029 tons, viz.: 313 sailing vessels, 6,236 tons; 51 steamers, 4,826 tons; and 12 barges, 967 tons. The port is connected with Richmond, Baltimore, Philadelphia, and New York by regular lines of steamers. Large quantities of oysters and early fruits and vegetables are shipped to northern ports. There are two national banks, with an aggregate capital of \$400,000; seven state and savings banks, with an aggregate capital of \$400,000; and a

number of manufactories. The city is governed by a mayor, a select council, and a common council. It has water and gas works, several charitable institutions, 26 churches and chapels (5 colored), three daily, one tri-weekly, and two weekly newspapers, and six public and several private schools and academies, among which is St. John's theological seminary (Roman Catholic).—Norfolk was founded in 1705, incorporated as a borough in 1736, and as a city in 1845. It was burned by the British in 1776, and severely visited by yellow fever in 1855. It was prominent during the first year of the civil war. At the commencement of 1861 there

were in the navy yard 12 vessels of war undergoing repairs. Among these were the Pennsylvania, of 120 guns, one of the largest war vessels then afloat, the sailing frigate Cumberland, and the steam frigate Merrimack. The repairs of the last two were nearly completed, and Commodore McCauley, the commander of the navy yard, was directed, April 16, to get them ready for sea. In the mean while a body of Virginia troops under Gen. Taliaferro had entered the city, and an agreement was entered into between him and McCauley to the effect that none of the vessels should be removed from the navy yard, and no shot fired except in self-defence. But McCauley decided to destroy what he could not remove, and gave orders to burn or scuttle all the vessels except the Cumberland. He was soon superseded by Capt. Paulding, who undertook to complete what McCauley had begun. Fire was set to the navy yard; the Pennsylvania was burned to the water's edge, the Merrimack was scuttled, and the Cumberland sailed away. But the workshops and foundries were little injured; the Merrimack was soon raised, and converted into an iron-clad, which was named the Virginia; and Norfolk became the chief naval depot of the confederacy. The necessity of concentrating all the forces in Virginia for the defence of Richmond compelled the abandonment of Norfolk, May 3, 1862, and on the 10th formal possession was taken by the federals, who retained undisputed hold of it until the close of the war.

NORFOLK, Duke of. See HOWARD, THOMAS.

NORFOLK ISLAND, a dependency of New South Wales, in the S. Pacific ocean, about 1,000 m. N. E. of Sydney, in lat. $28^{\circ} 58' S.$, and lon. $167^{\circ} 46' E.$ It is the largest and most delightful of a small cluster consisting of Norfolk, Nepean, and Philip islands, together with several islets, or rocks, called the Bird islands. It is about 5 m. long, with an average breadth of nearly 3 m.; area, about 14 sq. m. Its general elevation is 400 ft. above the sea, except on the N. W. corner, where Mt. Pitt rises to the height of 1,050 ft. The surface is very uneven, and the coast high and precipitous. The principal tree is the Norfolk island pine, which grows to a very great size, but the wood is of little use except for building. Maple, ironwood, a small species of palm, a gigantic fern having fronds 11 ft. in length, the lemon, guava, banana, yam, sweet potato, and arrowroot grow luxuriantly; and oranges, coffee, maize, and wheat may be raised. The climate is healthy and very agreeable. Horses, horned cattle, sheep, and other domestic animals have been introduced.—Norfolk island was discovered by Capt. Cook in 1774, and in 1787 was settled by convicts and freedmen from New South Wales; but it was abandoned in 1810, and the buildings were destroyed. In 1825 it was made a penal establishment for incorrigible offenders among the convicts of New South Wales, for which, as there are only two spots

where a landing can be effected, and there even with danger, it was thought peculiarly well adapted. At one time the number of prisoners exceeded 2,000; large prisons and other buildings were erected, various improvements made, and a strong force kept order and prevented escape; notwithstanding which many convicts made their way to various South sea islands. The transportation of convicts to New South Wales having ceased, Norfolk island was abandoned in 1855. In 1857 the island was given by the British government to the descendants of the mutineers of the Bounty, 194 in number; and though some have since returned to Pitcairn, a number of them remain at Norfolk island.

NORICUM, a province of the Roman empire, in S. E. Germany, bounded N. by the Danube, E. by Mt. Cetus (now Wiener Wald), which separated it from Pannonia, S. by the Savus (Save) and the Carnic Alps, and W. by the Enus (Inn), which separated it from Vindeliccia and Rhetia. It thus comprised most of the modern provinces of Upper and Lower Austria and Styria, the whole of Carinthia, and parts of Carniola, Salzburg, and Bavaria. The most important range of mountains was the Noric Alps, in the neighborhood of Salzburg, where excellent iron was mined; gold is also said to have been found. The chief towns were: Noreia or Noreja (Neumarkt in Styria), the capital of the Taurisci or Norici before the Roman conquest, and the place where Carbo was routed by the Cimbri in 113 B. C.; Juvavum or Juvavia (Salzburg), a colony of Hadrian, on the Juvavus (Salzach); Lentia (Linz), on the Danube; and Lauriacum (Lorch), at the mouth of the Anisus (Enns). Noricum was conquered by the Romans toward the close of the reign of Augustus, and at a later period was divided into two provinces: Noricum Ripense, adjoining the Danube, and Noricum Mediterraneum, S. of the former.

NORMAL SCHOOLS (Lat. *norma*, a carpenter's square; hence, a rule or pattern), establishments for the education of teachers. The first normal school was organized in Stettin, Prussia, in 1735. Frederick the Great established a second in Berlin in 1748. One was opened in Hanover in 1757, and others soon afterward in various parts of Germany. Since the beginning of the present century, training schools for teachers have been rapidly multiplying. The course of instruction is now generally extended to three or four years. In some of the German states the great majority of the teachers are graduates of the normal schools. The first seminary for teachers in France was established in 1810, and the first in the Netherlands in 1816; and since that time they have been introduced into the other principal countries of Europe. In Great Britain they are commonly called training colleges. The first suggestion for the establishment of normal schools in the United States was made by Prof. Denison Olmsted, in an oration delivered in New

Haven, in 1816. Gov. De Witt Clinton, in his message to the legislature of New York in 1825, recommended a seminary for teachers, and repeated the recommendation the next year. During the next ten years the subject was agitated by well known writers and educators, in various periodicals. In 1838 Edmund Dwight offered the sum of \$10,000 for the purpose of establishing a normal school in Massachusetts, on condition that the state should appropriate an equal amount for the same purpose. Accordingly the first normal school in America, that now established at Framingham, was opened at Lexington, July 3, 1839. Two others were soon opened, and five are now supported by the state of Massachusetts. Nearly every state in the Union now has one or more normal schools, chartered by the legislature, and generally sustained wholly or in part by annual appropriations. A few of them exist only as departments of the state universities; most of them have model schools attached. Accounts of them will be found in the articles on the respective states. Normal schools under municipal management are also established in several of the larger cities of the United States. In 1873 there were in the United States 119 normal schools, with about 900 instructors and 17,000 students in course. There are also several in British America.

NORMANBY, Constantine Henry Phipps, marquis of, an English statesman, born at Mulgrave castle, Yorkshire, May 15, 1797, died in South Kensington, July 28, 1863. He graduated at Cambridge in 1818, and at once entered parliament, where he advocated the Roman Catholic claims and seconded the reform bill. In 1831 he succeeded his father as earl of Mulgrave. In 1832-'3 he was governor of Jamaica, where he suppressed without bloodshed a dangerous insurrection of the soldiery, and carried out the emancipation act. He was made lord privy seal in 1834, and from 1835 to 1839 was lord lieutenant of Ireland. In 1838 he was created marquis of Normanby. After being for a few months in 1839 secretary of state for the colonies, he was till 1841 secretary for the home department. From 1846 to 1852 he was ambassador at Paris, and from 1854 to 1858 at Florence. He published "A Year of Revolution," from his journal in Paris (2 vols., 1857), and several novels, among which are "Matilda" (1825) and "Yes and No" (1827).

NORMANDY, an ancient N. W. province of France, extending along the English channel, from a point S. of the mouth of the Somme to the bay of Cancale, bounded N. and W. by the English channel, E. by Picardy and Isle-de-France (from which it was partly divided by the Bresle, the Epte, and the Eure), and S. by Perche, Maine, and Brittany, the upper Sarthe and the lower Conesnon forming a part of the dividing line. The province is mostly level and fertile, producing grain, flax, and fruit, and an excellent breed of horses; the

bays and rivers abound in fish. Rouen was the capital of the province and the chief town of the division of Upper Normandy, and Caen was the chief town of Lower Normandy. The early Gallic inhabitants were subdued by the Romans, who included the territory in the province of Gallia Lugdunensis Secunda. It was comprised within the limits of Neustria under the domination of the Merovingian kings, and received the name of Normandy from the Northmen, who occupied it in the beginning of the 10th century. In 912 Charles the Simple gave his sanction to the conquests made by the Northmen, and Rollo, their chief, received the title of duke of Normandy. The new duchy soon rose to be one of the most prosperous provinces of France. William the Bastard, son of Robert the Devil, sixth successor of Rollo, became in 1066 the conqueror and first Norman king of England. On his death (1087) England and Normandy were separated, the latter reverting to Robert Courteheuse, while William Rufus seized upon the former. Henry I. Beauclerc ruled over both, but his daughter Matilda was only duchess of Normandy. Her son, Henry II., accomplished another reunion, which lasted until the reign of King John. This prince was summoned before the court of peers at Paris, as a vassal of the French king, on the charge of having murdered his nephew Arthur of Brittany, and sentenced to forfeit his duchy, which was seized immediately by King Philip Augustus; but it was twice again held by the English, first under Edward III., and a second time, from 1417 to 1450, under Henry V. and Henry VI. Under Charles VII. of France it was finally rescued from the English by Dunois; and although the title of duke of Normandy was still occasionally used, the duchy thenceforth was an integral portion of the kingdom of France, and one of its most prosperous and enterprising provinces. In 1790 it was divided into the departments of Seine-Inférieure, Eure, Calvados, Orne, and Manche.—See "History of Normandy and of England," by Sir Francis Palgrave (4 vols., 1851-'64). Pugin, Turner, and other artists and writers have treated of the archæological and architectural treasures of Normandy; while the picturesque characteristics of nature and of popular custom and life have been described by many writers, including Jules Janin, *La Normandie* (Paris, 1864); George Musgrave, "A Ramble through Normandy" (London, 1855); and J. F. Campbell, "Life in Normandy" (London, 1872).

NORMANS. See **NORTHMEN**.

NORRIS, John, an English clergyman, born at Collingborne-Kingston, Wiltshire, in 1657, died at Bemerton in 1711. He graduated at Exeter college, Oxford, in 1680, and became a disciple of Malebranche. His first original work, entitled "An Idea of Happiness" (1683), at once gave him a position in the ranks of the Platonic divines of the 17th century. The Rye house plot of 1683 led him to attack the whigs

in a treatise entitled "A Murnival of Knaves, or Whiggism Displayed and Burlesqued out of Countenance." Soon afterward he published a Latin work against the theology of the Genevan divines, and in 1691 a treatise against the nonconformists. In 1684 he took orders, and in the same year published a volume entitled "Poems and Discourses," which was followed in 1687 by his "Miscellanies" in prose and verse, which reached a ninth edition in 1730. In 1684 he began a correspondence with Dr. Henry More in regard to some speculative difficulties, which lasted three years, and was published in 1688. In that year he published "The Theory and Regulation of Love." In 1689 he published a treatise on "Reason and Religion," and in 1690 four volumes of "Practical Discourses on the Beatitudes," of which a tenth edition was published in 1724, under the title "Christian Blessedness." In 1692 he attacked the views of the Quakers, and shortly after was made rector of Bemerton near Salisbury. In 1695 he published "Letters concerning the Love of God." The deist John Toland having written a treatise entitled "Christianity not Mysterious," Norris published in 1697 in answer, "An Account of Reason and Faith in relation to the Mysteries of Christianity." In 1701 he published "An Essay toward the Theory of the Ideal or Intelligible World," of which the second part appeared in 1704; and in 1708 the "Natural Immortality of the Soul."

NORRBOTTEN, the northernmost län or province of Sweden, divided from Lapland by the Tornea and Muonio rivers; area, 39,797 sq. m.; pop. in 1872, 78,659. It is traversed by the Kiölen mountains, and has many lakes and rivers, among the latter the Kalix, Lulea, and Pitea. The summers are exceedingly hot, though the climate is not regarded as unhealthy. Timber is the chief production, and some grain and cattle are raised. Capital, Pitea.

NORRISTOWN, a borough and the capital of Montgomery co., Pennsylvania, on the N. bank of the Schuylkill river, and on the Philadelphia, Germantown, and Norristown railroad, 16 m. N. W. of Philadelphia; pop. in 1850, 6,024; in 1860, 8,848; in 1870, 10,753. It has a healthy and beautiful situation, and the neighborhood abounds in excellent marble, iron, and limestone. The streets are laid out at right angles and are well paved and finely shaded, and the houses are built in a neat, substantial manner, of brick and marble. The main street is sewered, and water and gas are conveyed through it in pipes. The principal buildings are the court house, the jail, and music hall. The court house, finished in 1855, is built of the light gray native marble, and cost over \$200,000. The Schuylkill river is crossed by two substantial covered bridges, about 800 ft. long, leading into Bridgeport on the opposite bank. The improved navigation of the Schuylkill affords facilities for the trade of the town, which is active and increasing. Among the manufactories are two blast furnaces, six wool-

len and cotton mills, four machine works, tack works, glass works, an oil refinery, and three rolling mills. There are three banks, a seminary, five public schools (number of pupils enrolled Jan. 1, 1875, 1,810), three daily and five weekly (one German) newspapers, and 13 churches. The borough was incorporated in 1812, and enlarged in 1853.

NORRLAND, Wester. See WESTER NORRLAND.

NORRKÖPING, a town of Sweden, in the province of Linköping, at the mouth of the Motala in the Braviken, an inlet of the Baltic, 85 m. S. W. of Stockholm, with which it is connected by railway; pop. in 1869, 22,997. It is one of the oldest and finest towns of Sweden, is regularly built, and has wide and well paved streets, and six public squares. It contains three churches, a synagogue, a college, and a hospital. The Motala, flowing through the town, forms two islands, is crossed by four bridges, and furnishes in several cascades the motive power which renders Norrköping the most important manufacturing town in Sweden. Cloth, hosiery, paper, playing cards, tobacco, sugar, soap, and starch are manufactured. There are several ship yards. The registered shipping includes 11 steamers and 19 sailing vessels; about 200 foreign and 1,100 Swedish vessels enter and leave the port annually.—The town was founded in the 12th century. In 1719 it was totally destroyed by the Russians, and four times in the early part of the present century it suffered severely by fire.

NORSE LANGUAGES. See the articles on the languages and literatures of Iceland, Denmark, Sweden, and Norway.

NORTH, Christopher. See WILSON, JOHN.

NORTH. I. Francis, Lord Guilford, an English jurist, son of the fourth Baron North, born Oct. 22, 1637, died Sept. 5, 1685. He studied at St. John's college, Cambridge, and was called to the bar at the Middle Temple in 1661. Indefatigable in his law studies, he abstained from the ordinary pleasures of youth, and left untried no artifice and scrupled at no humiliation which would advance his interests. Sir Jeffrey Palmer, the first attorney general under the restoration, early assisted him in getting into practice; and he became one of the leaders of the Norfolk circuit, and was soon retained in every important cause. Gaining the favor of the court by pleading against the privileges of parliament in the case of the prosecution of the five members, which had been brought into the house of lords on a writ of error from the court of king's bench, he was in 1671 appointed solicitor general and knighted; and in November, 1673, he succeeded Sir Heneage Finch as attorney general. In January, 1675, he was made chief justice of the court of common pleas, in which office he conducted to a successful issue a dispute with the court of king's bench as to their respective jurisdiction. In 1679 he was admitted a member of the new council established by the king; and upon the death of the earl of Not-

tingham in 1682, he was made lord keeper of the great seal. In September, 1683, he was created Baron Guilford, of Guilford, Surrey. Throughout his judicial career he favored the prerogatives of the crown in accordance with the strong tory leanings of his family. At the close of his life he suffered in political influence from the ambition and insolence of Jeffreys, and died broken down in spirit. His character and professional attainments are highly extolled by his brother Roger North; but according to Macaulay, this biographer, though under the influence of the strongest fraternal partiality, "was unable to portray the lord keeper otherwise than as the most ignoble of mankind." The same writer adds: "The intellect of Guilford was clear, his industry great, his proficiency in letters and science respectable, and his legal learning more than respectable. His faults were selfishness, cowardice, and meanness." Yet he had the courage shortly before his death to remonstrate with the king upon the dangers inseparable from his violent and arbitrary measures. He was the author of some scientific and miscellaneous papers, and of a few political essays.—See "Lives of the Right Hon. Francis North, Baron of Guilford, Sir Dudley North, and the Hon. and Rev. Dr. John North," by Roger North (2 vols. 4to, 1742-4; new ed., 3 vols. 8vo, 1826). **II. Frederick**, second earl of Guilford and eighth Baron North, generally known as Lord North, an English statesman, great-grandson of the preceding, born April 13, 1733, died Aug. 5, 1792. He was educated at Eton and at Trinity college, Cambridge, and made a lengthened tour on the continent. He entered parliament in 1754 from the family borough of Banbury, which he represented continuously for nearly 30 years, and in 1759 was appointed a commissioner of the treasury in the Pitt ministry. In 1763 he directed the proceedings which led to the expulsion of Wilkes, and in 1764-'5 supported the stamp act and the right of the mother country to tax the colonies. Upon the formation of Lord Chatham's second ministry in 1766 he was appointed, jointly with Mr. George Cooke, paymaster of the forces, having refused to accept office under the preceding Rockingham administration. In 1767 he was appointed chancellor of the exchequer, succeeding Charles Townshend as leader in the house of commons, and continuing in that office in the duke of Grafton's ministry. On the resignation of the latter in January, 1770, he became prime minister. His administration, extending to March, 1782, in the language of an English writer, "teemed with calamitous events beyond any of the same duration to be found in our annals;" the American war being its great feature, and the efforts of Lord North being directed principally to measures for the coercion of the revolted colonies. With the popular feeling against him, and a powerful opposition in the house of commons, Lord

North nevertheless for upward of six years contended almost single-handed with his adversaries. Although he never wavered in his opinion of the right of parliament to tax the colonies, it appears from the statement of his daughter, Lady Charlotte Lindsay (who died in 1849), that during the last three years of his administration he entertained serious doubts as to the expediency of continuing the war, and was induced to persevere by the wishes of George III. Defeated in the house of commons on the question of the continuance of the war, he resigned office, and after the short-lived Rockingham administration he joined his old antagonist Fox in breaking down the succeeding Shelburne cabinet. In April, 1783, he returned to office as a joint secretary of state with Fox in the "coalition ministry" formed by the duke of Portland, the unpopularity of which caused its dissolution in the succeeding December. Soon afterward he retired definitively from public life. During his last five years he was afflicted with total blindness, which he endured with unvarying cheerfulness. He succeeded to the title of earl of Guilford in 1790.

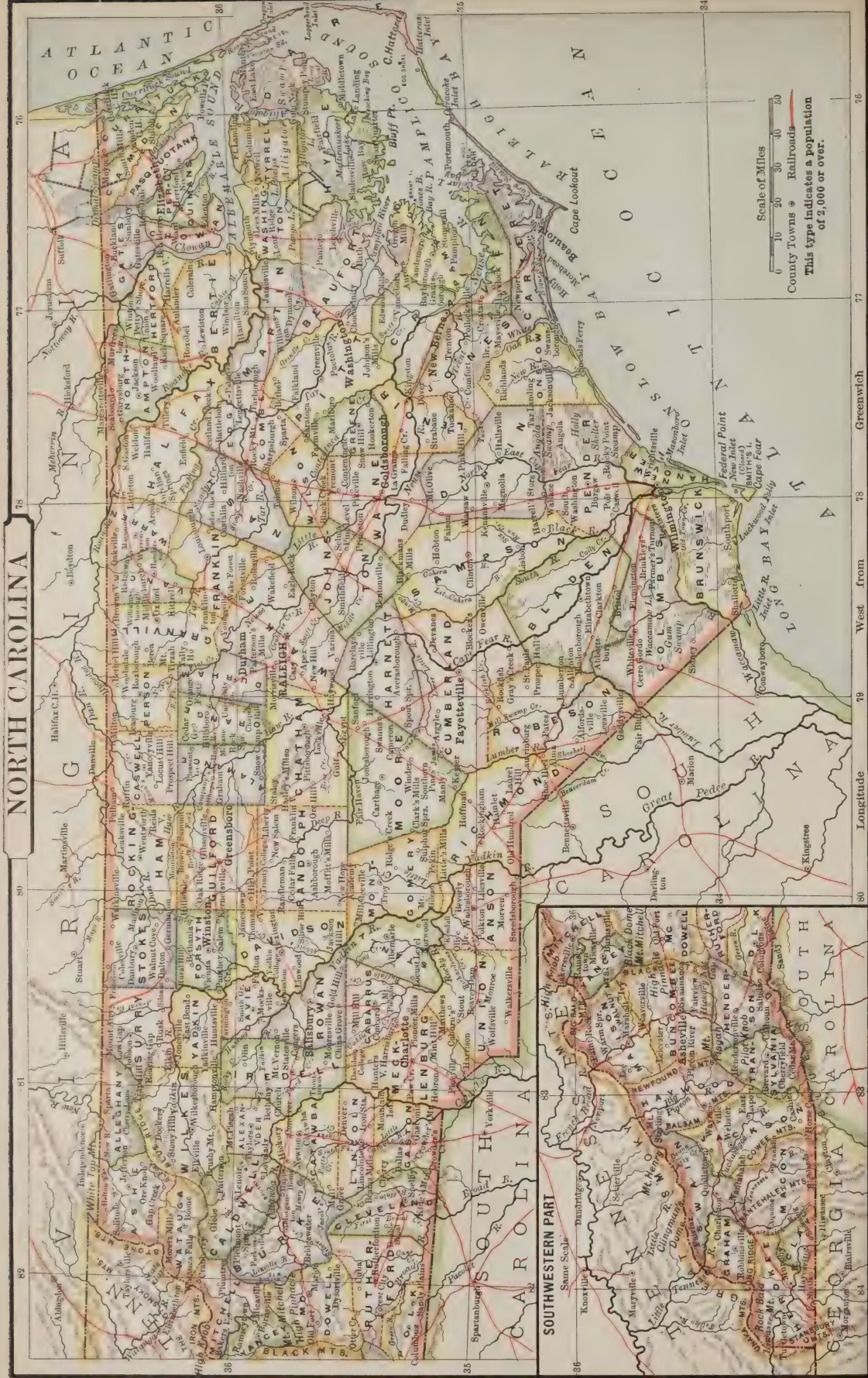
NORTH ADAMS. See ADAMS, Mass.

NORTH AMERICA. See AMERICA.

NORTHAMPTON. I. An E. county of Pennsylvania, bounded E. by the Delaware river, which separates it from New Jersey, and intersected toward the south by the Lehigh river; area, 370 sq. m.; pop. in 1870, 61,482. The Kittatinny or Blue mountains form the N. W. boundary, and the South mountain is on the S. E. In the valley between them are beds of valuable limestone, quarries of slate, and several iron mines. Several railroads and three canals meet at Easton. The chief productions in 1870 were 473,295 bushels of wheat, 122,584 of rye, 707,494 of Indian corn, 539,067 of oats, 23,838 of buckwheat, 232,038 of potatoes, 36,240 tons of hay, 14,271 lbs. of wool, 843,541 of butter, and 3,134 gallons of wine. There were 7,999 horses, 10,841 milch cows, 4,060 other cattle, 5,562 sheep, and 17,073 swine. The total number of manufacturing establishments was 655, with \$7,099,285 capital; value of annual products, \$12,530,834. The principal were 9 manufactories of agricultural implements, 4 of boats, 17 of brick, 19 of carriages and wagons, 2 of railroad cars, 31 of men's clothing, 2 of cotton and 4 of woollen goods, 9 of furniture, 4 of pig iron, 3 of forged and rolled iron, 13 of castings, 16 of tanned and 9 of curried leather, 19 of lime, 3 of machinery, 4 of paints, 14 of roofing materials, 16 of saddlery and harness, 11 of school slates, 26 of tin, copper, and sheet-iron ware, 26 of cigars, 1 of wire, 2 of zinc, 7 breweries, 33 flour mills, and 20 saw mills. Capital, Easton. **II.** A S. E. county of Virginia, forming the S. extremity of the peninsula lying between Chesapeake bay and the Atlantic ocean; area, 320 sq. m.; pop. in 1870, 8,046, of whom 4,848 were colored. The coast line on the west is indented by nu-

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NORTH CAROLINA



merous inlets, and on the east, in the Atlantic, are several small islands. The surface is level and the soil light and sandy. The chief productions in 1870 were 2,747 bushels of wheat, 266,594 of Indian corn, 139,668 of oats, 61,616 of Irish and 79,689 of sweet potatoes, and 2,372 lbs. of wool. There were 1,238 horses, 1,217 milch cows, 1,715 other cattle, 1,171 sheep, and 6,773 swine. Capital, Eastville. **III.** A N. E. county of North Carolina, bounded N. by Virginia, and S. W. by the Roanoke river; area, about 350 sq. m.; pop. in 1870, 14,749, of whom 8,510 were colored. It has a diversified surface and generally fertile soil. It is traversed by the Seaboard and Roanoke, the Raleigh and Gaston, and the Petersburg and Weldon railroads, and the Gaston branch of the last named line. The chief productions in 1870 were 13,680 bushels of wheat, 320,924 of Indian corn, 36,860 of oats, 11,861 of Irish and 45,435 of sweet potatoes, 7,320 bales of cotton, 8,300 lbs. of tobacco, 3,348 of wool, 24,039 of butter, and 3,701 gallons of molasses. There were 1,317 horses, 896 mules and asses, 1,622 milch cows, 913 working oxen, 2,917 other cattle, 2,955 sheep, and 13,854 swine. Capital, Jackson.

NORTHAMPTON, the shire town of Hampshire co., Massachusetts, on the W. bank of the Connecticut river, and on the New Haven and Northampton and the Connecticut River railroads, 80 m. W. of Boston and 15 m. N. of Springfield; pop. in 1850, 5,278; in 1860, 6,788; in 1870, 10,160. It contains four post villages, Florence, Leeds, Loudville, and Northampton. The last, the principal village, is noted for its beauty. It is situated on elevated ground about a mile W. of the river, has broad and well shaded streets, and commands a splendid view of the Connecticut valley and of Mts. Tom and Holyoke. It has water works, a fire department, and a street railroad, is lighted with gas, and is connected with Hadley on the opposite bank of the Connecticut by a bridge 1,230 ft. long and 26 ft. wide. Just W. of the village, on an eminence, surrounded with groves of forest trees, are the Round Hill water-cure establishment, with accommodations for 200 patients, and the Clarke institute for deaf mutes, founded by the late John Clarke in 1867, and endowed with \$300,000. In the same vicinity is the state lunatic asylum established in 1858, with imposing buildings capable of accommodating 350 patients. Loudville is in the S. W. part of the town. Florence and Leeds are manufacturing villages, respectively 3 m. and 5 m. N. W. of Northampton. The former is the seat of the Florence sewing machine company's works. The principal articles of manufacture are sewing machines, skates, brooms, machinery, foundry products, paper, agricultural implements, silk, cotton cloth, cutlery, carriages and wagons, emery wheels, files, furniture, mirrors, pencils, tape, wire, screws, turbine water wheels, and rubber goods. The town contains three national banks, with a joint capital of \$1,150,000, three savings banks, a

loan and trust company, a fire insurance company, five hotels, graded public schools, including a high school, a public library with 12,000 volumes, a female college, three weekly newspapers, and 11 churches, viz.: 2 Baptist, 4 Congregational, 1 Episcopal, 2 Methodist, 1 Roman Catholic, and 1 Unitarian.—Northampton was settled in 1654.

NORTHAMPTON, a municipal and parliamentary borough and market town of England, capital of Northamptonshire, on the left bank of the Nen, 60 m. N. W. of London; pop. in 1871, 41,040. It occupies the summit of an eminence rising from the river, over which there are several bridges. The principal manufactures are boots and shoes. There are also iron and brass foundries, flour mills, breweries, and coach factories. In 1872 it had 38 places of worship, of which 12 belonged to the church of England.

NORTHAMPTONSHIRE, an inland county of England, bordering on the counties of Lincoln, Cambridge, Huntingdon, Bedford, Buckingham, Oxford, Warwick, Leicester, and Rutland; area, 984 sq. m.; pop. in 1871, 243,896. The principal rivers are the Nen, Welland, and Avon. The surface is undulating, belonging to the basin of the Nen and watered by numerous rivulets. The N. E. extremity of the county belongs to the great fen district, and is only a few feet above the sea. The county is well wooded with oak, ash, beech, and elm. The climate is mild and healthy. The chief agricultural pursuit is stock raising. There are no manufactures of any importance, except boots and shoes. The county has railway communication with all parts of the country. There are two principal canals, the Grand Junction canal and the Grand Union canal. The principal towns are Northampton, the capital, Peterborough, Daventry, Kettering, and Oundle.

NORTH BRIDGEWATER. See BRIDGEWATER.

NORTHBROOK, Barons. See BARING.

NORTH CAPE. See CAPE NORTH.

NORTH CAROLINA, one of the original states of the American Union, situated between lat. 33° 53' and 36° 33' N., and lon. 75° 25' and 84° 30' W.; extreme length 490 m. from E. to W., extreme breadth 185 m. from N. to S.; area, 50,704 sq. m. It is bounded N. by Virginia, on the line of 36° 33', E. and S. E. by the Atlantic ocean, S. by South Carolina and Georgia, and W. by Tennessee. It is divided into 94 counties, as follows: Alamance, Alexander, Alleghany, Anson, Ashe, Beaufort, Bertie, Bladen, Brunswick, Buncombe, Burke, Cabarrus, Caldwell, Camden, Carteret, Caswell, Catawba, Chatham, Cherokee, Chowan, Clay, Cleaveland, Columbus, Craven, Cumberland, Currituck, Dare, Davidson, Davie, Duplin, Edgecombe, Forsyth, Franklin, Gaston, Gates, Graham, Granville, Greene, Guilford, Halifax, Harnett, Haywood, Henderson, Hertford, Hyde, Iredell, Jackson, Johnston, Jones, Lenoir, Lincoln, McDowell, Macon, Madison, Martin, Mecklenburg, Mitchell, Montgomery, Moore,

Nash, New Hanover, Northampton, Onslow, Orange, Pamlico, Pasquotank, Pender, Perquimans, Person, Pitt, Polk, Randolph, Richmond, Robeson, Rockingham, Rowan, Rutherford, Sampson, Stanley, Stokes, Surry, Swain, Transylvania, Tyrrel, Union, Wake, Warren, Washington, Watauga, Wayne, Wilkes, Wilson, Yadkin, and Yancey. North Carolina has no very populous towns. Wilmington, the chief seaport and largest city in the state, had 13,446 inhabitants in 1870, and Raleigh, the capital, 7,790. The other cities are New Berne, 5,849; Fayetteville, 4,660; and Charlotte, 4,473. The following are towns having in 1870 from 1,000



State Seal of North Carolina.

to 2,500 inhabitants: Beaufort, Washington, Asheville, Plymouth, Tarboro, Edenton, Goldsboro, Kinston, and Wilson. Other towns are Concord, Elizabeth City, Greensboro, Greenville, Hillsboro, Louisburg, Lumberton, Murfreesboro, Oxford, Salisbury, Smithville, Statesville, and Winston. The population of North Carolina and its rank in the Union at decennial periods, according to the federal census, have been as follows:

CENSUS.	Whites.	Slaves.	Free colored.	Total population.	Rank.
1790	288,204	100,572	4,975	393,751	3
1800	387,764	193,296	7,043	487,103	4
1810	376,410	168,824	10,266	555,500	4
1820	419,200	204,917	14,712	638,829	4
1830	472,843	245,601	19,549	737,993	5
1840	484,870	245,817	22,732	753,419	7
1850	553,028	288,548	27,463	868,039	10
1860	629,942	331,059	30,463	992,022	12
1870	678,470	.....	391,650	1,071,861	14

Included in the population of 1860 were 1,158 Indians. Of the total population in 1870, 518,704 were males and 552,657 females; 1,068,332 were of native and 3,029 of foreign birth; and there were 1,241 Indians. Of the natives, 1,028,678 were born in the state, 15,425 in Virginia and West Virginia, 13,537 in South Carolina, 3,505 in Tennessee, 2,052 in Georgia, 786 in New York, and 674 in Pennsylvania; and 307,362 persons born in the state were living in other parts of the Union. Of the

foreigners, 904 were born in Germany, 677 in Ireland, 490 in England, and 420 in Scotland. The density of population was 21.13 to a square mile. There were 205,970 families, with an average of 5.20 persons to each, and 202,504 dwellings, with an average of 5.29 to each. The increase of population from 1860 to 1870 was 7.93 per cent. There were 182,421 persons from 5 to 18 years of age, 94,238 males from 18 to 45, and 75,274 male citizens 21 years old and upward. There were 339,789 persons 10 years old and over who could not read, and 396,993 unable to write; of the latter, 191,961 were white and 205,032 colored, 195,692 males and 201,301 females; 174,834 were 21 years old and over, and 222,159 were from 10 to 21 years. In 1874 there were 92,043 white and 48,277 colored polls. The number of paupers supported during the year ending June 1, 1870, was 1,706, at a cost of \$136,470. Of the number (1,652) receiving support at that date, 1,124 were white and 528 colored. The number of persons convicted of crime during the year was 1,311. Of the number (468) in prison June 1, 1870, 138 were white and 330 colored. The state contained 835 blind, 619 deaf and dumb, 779 insane, and 976 idiotic. Of the total population 10 years old and over (769,629), there were engaged in all occupations 351,299; in agriculture, 269,238, including 168,978 laborers, 98,290 farmers and planters, 336 turpentine farmers, and 1,332 turpentine laborers; in professional and personal services, 51,290, of whom 861 were clergymen, 26,659 domestic servants, 16,830 laborers not specified, 574 lawyers, 1,143 physicians and surgeons, and 1,798 traders not specified; in trade and transportation, 10,179; and in manufactures and mechanical and mining industries, 20,592. The total number of deaths from all causes was 10,588, being 0.98 per cent. of the entire population; from consumption 1,236, there being 8.6 deaths from all causes to one from this disease. There were 741 deaths from pneumonia, 436 from intermittent and remittent fevers, 862 from enteric fever, and 418 from diarrhoea.—The state may be physically divided into the coast and swamp land section, extending from 80 to 100 m. inland; the middle section, extending to the foot of the mountains; and the mountain section, embracing the W. part of the state. The first section abounds in valuable timber, and includes the turpentine region. The country is level, with many swamps and marshes; the streams are sluggish and muddy. Much of the land is sandy, but a large portion of this region is very fertile, the swamps being generally so. Rice, cotton, tobacco, and maize flourish. The Great Dismal swamp extends N. from Albemarle sound into Virginia, covering an area of about 150,000 acres. (See BOG, and DISMAL SWAMP.) Between Albemarle and Pamlico sounds is Alligator or Little Dismal swamp, which is about as large as the other. It is estimated that the swamps of the state alto-

gether cover 3,000,000 acres. Parts of the Little Dismal swamp have been drained so as to make valuable rice and grain lands; and a considerable quantity of the swamp land may be drained or reclaimed by embankment. The middle section is adapted to the production of the cereals, tobacco, and cotton. It possesses great mineral wealth, and abounds in streams affording extensive water power. About 100 m. from the coast the land begins to rise into small hills, and a little further westward is every variety of hills and dales consistent with a fertile country fit for cultivation. West of the Yadkin and Catawba rivers is an elevated region from 1,000 to 2,000 ft. above the sea; and still beyond this plateau the main range of the Appalachian mountains traverses the state from N. E. to S. W., reaching here its greatest altitude. (See APPALACHIAN MOUNTAINS, and BLACK MOUNTAINS.) The Iron or Smoky mountains separate the state from Tennessee. Between these two ridges is a plateau whose altitude ranges from 3,500 to 4,000 ft., being the highest plateau of the same extent east of the Rocky mountains. In the centre stands the symmetrical forest-crowned summit of the Sugar mountain (5,312 ft.), and on its margin rises the Grandfather, 5,897 ft., the highest summit of the Blue Ridge, though inferior in altitude to the peaks of the Black mountains. The mountain region presents much beautiful scenery, and affords rich grazing lands and abundant water power. The coast line, beginning at Little River inlet, on the borders of South Carolina, runs nearly E. to Cape Fear, thence N. E. to Cape Lookout, thence in the same general direction to Cape Hatteras, and thence N. to the Virginia line, a distance in all of nearly 400 m. Cape Lookout is about midway between Cape Fear and Cape Hatteras. Two open bays, Onslow and Raleigh, are formed by these capes. Along the whole length of the coast are sandy, barren desert islands, from $\frac{1}{2}$ to 2 m. wide, separated by numerous inlets, few of which are navigable. From these islands shoals extend far into the sea, which render the navigation of this coast exceedingly dangerous. Cape Hatteras forms the headland of the dangerous triangular island beach which separates Pamlico sound from the ocean. Narrow, shallow lagoons, filled with constantly changing sand bars, extend all along the coast S. of Cape Lookout between the mainland and the sand islands. In the N. E. part of the state, above Cape Lookout, are two extensive sounds, Pamlico and Albemarle, and a smaller one, Currituck, which are cut off from the ocean by the islands or sand banks before referred to. Pamlico sound, which is the most southern, extends from S. W. to N. E. about 80 m., and is from 10 to 30 m. wide, with a depth of 20 ft., and terminates westwardly in the wide bays of the Neuse and Pamlico rivers. There are several shoals within this sound. On the north it connects with Albemarle and Currituck sounds,

and on the southeast with Raleigh bay by Ocracoke inlet, the only navigable inlet N. of Cape Lookout. Albemarle sound, which is 60 m. long and from 4 to 15 broad, extends W. into the mainland, and is not connected with the ocean except through Pamlico sound. Its waters are nearly fresh and not affected by the tides. Currituck sound extends N. from the mouth of Albemarle 50 m., passing beyond the limits of North Carolina. It is from 2 to 10 m. wide, and runs parallel with the coast, from which it is cut off, like Pamlico, by narrow sand islands. It connects with the ocean only through Pamlico sound. There are spacious harbors at Edenton, New Berne, Beaufort, and Wilmington.—The rivers of North Carolina are numerous, but have shifting sand bars at their mouths, and rapids in their descent from the hilly regions. Cape Fear river is formed by the junction of the Haw and Deep rivers, which rise in the N. part of the state, and unite in the S. E. corner of Chatham co. The Cape Fear follows a zigzag course, the general direction being E. S. E., for about 300 m., including one of the head branches, and empties into the Atlantic near Cape Fear. It is navigable for vessels drawing 12 ft. of water to Wilmington, 34 m., and for sloops and small boats to Fayetteville, 120 m. The Roanoke has its source in the S. part of Virginia, where it is formed by the confluence of the Dan and Staunton rivers, passes into North Carolina in Warren co., and, taking a serpentine course with a general S. E. direction, empties into Albemarle sound. It is 250 m. long, navigable for small sea vessels for 30 m. and for steamboats 120 m. to Halifax. By means of a canal round the falls, very small boats are able to ascend to the Dan and Staunton. The Neuse river rises in the N. part of the state, takes a circuitous course in a general S. E. direction, and empties into Pamlico sound. Beginning a short distance above New Berne, it gradually spreads out into a lagoon. It is navigable for boats to Waynesborough, 120 m. from the sound. The Tar river also rises in the N. part of the state, between the Neuse and Roanoke, and, after a course generally similar to those rivers, with Tranter's creek forms at Washington an estuary called Pamlico river, and is navigable for steamboats to Tarborough, nearly 100 m., including the estuary. The Chowan rises in Virginia, flows a little E. of S., and empties into Albemarle sound. It is navigable for 75 m. Among the other rivers worthy of mention are the Yadkin and Catawba, which rise in the W. part of the state, run S., and reach the Atlantic through South Carolina, the former as the Great Pedee, and the latter through the Santee river. From the W. slope of the Blue Ridge flow New river, the Little Tennessee, and several other streams, the waters of which, breaking through the Iron or Smoky mountains, join those of the Ohio and Mississippi.—North Carolina is geologically divided into three nearly parallel belts or zones.

The first or eastern comprises the level sandy country along the coast, and extends back to the falls of Roanoke at Weldon, and to the first or lowest falls of all the other rivers. The midland zone is bounded W. by the line which skirts the outliers of the Blue Ridge. The third comprehends the western and mountainous part of the state. The systems of rocks are primary, and belong to the most ancient of the geological series, called azoic, metamorphic, &c. They are granitoid, gneissic, and schistose. The rocks of the lower belt are tertiary or cretaceous, and contain no metals, except the earthy ores of iron and manganese. The metamorphic rocks associated with granitic occupy the midland counties in part, and the extreme western border, and contain the most important repositories of the ores. The granite formations compose two continuous belts, which traverse the state in a N. E. and S. W. direction. Raleigh is situated on the easterly belt, which is from 20 to 25 m. wide. The granite in this belt is generally light gray, and composed of quartz, feldspar, and a small quantity of mica, feldspar prevailing. It furnishes very good building stone, but no metallic veins. The western belt is from 10 to 14 m. wide, and differs from the eastern by hornblende taking the place of mica. The rock is frequently soft and entirely decomposed, but portions of it contain good building material, and unlike the eastern belt it is traversed by numerous metallic veins and trap dikes. Here are gold mines, some of which produce copper. Buhrstone of good quality abounds in the midland counties, particularly in Montgomery. Agalmatolite, known as the figure stone of the Chinese, is found on Deep river, also near Troy, Montgomery co., and in some other places. Gold is extensively distributed through the hilly and mountainous portions of the state, and belongs chiefly to four geological positions, viz.: loose quartz grits beneath the surface soil; stratified layers contemporaneous with the rock; in connection with seams and joints of the rocks; and in regular veins, associated with quartz and the sulphurets of iron and copper. The gold-mining business has been carried on to a considerable extent in the state for nearly half a century, the regular veins proving the most productive and permanent; the most celebrated of these are the Gold Hill mines in Rowan co., which were discovered in 1842. Other regular veins have been worked in Davidson, Cabarrus, Stanley, Montgomery, and Mecklenburg cos. Irregular veins and surface gold are also found in the same counties to some extent, and in Catawba, Randolph, Union, and Franklin cos. Many remarkable specimens were found in the vicinity of the Reed mine in Cabarrus co. long before the vein was opened, one weighing 28 lbs. Gold is also found in Anson, Burke, Clay, Cleveland, Gaston, Guilford, Jackson, Lincoln, McDowell, Moore, Nash, Polk, and Yancey cos. Many of the mines that were once

productive have been abandoned. The principal counties producing gold are Mecklenburg, Lincoln, Montgomery, and Rowan. There was formerly a branch of the United States mint at Charlotte in Mecklenburg co. It is now an assay office. (See CHARLOTTE.) The whole amount of gold from North Carolina deposited at the United States mint and assay offices to June 30, 1874, was valued at \$10,090,656; silver, \$44,628; total, \$10,135,284. Silver and lead are associated in their ores in this state. Silver is found in Davidson and Clay cos., but the mines have been little worked. Copper is found in Guilford, Clay, Davidson, Jackson, and Mecklenburg cos. Iron is found on Deep and Dan rivers, and in other parts of the state; the ores embrace the hematites, and the specular and magnetic ores. There are mines in Clay and Yancey cos. Lead is found in Davidson co., copperas in Yancey, and black lead in Wake, Stokes, Yadkin, Yancey, &c. In Davidson co. is an important zinc mine, containing also gold and silver quartz. Bituminous and semi-bituminous coal is mined extensively on Deep river in Chatham co.; it is also abundant on the Dan. A belt of beautiful porphyry extends 7 or 8 m. N. E. from Jones Falls. Steatite, or soapstone, is common in the middle region of the state, and is quarried in Moore co. Limestone, grindstone, and whetstone exist in the W. part of the state. Alum and copperas slates are found in Cleveland and Rutherford cos. One of the most extensive deposits in the United States of corundum containing emery occurs in North Carolina; the beds lie on the N. W. side of the Blue Ridge, chiefly in Mitchell co. and the neighboring region. (See EMERY.) Extensive mica mines were discovered in Mitchell co. in 1867, and have since been worked with great profit; there are also mines in the adjoining county of Yancey. In the western section mineral springs (sulphur, chalybeate, and alum) abound, and have become places of public resort. Among the curiosities of the state are the Swannanoa gap, a deep pass in the mountains between Morgantown and Asheville; the Catawba Falls near by; the warm springs, Painted rock, and a curious rock called "the Chimneys," all in Buncombe co.; and the Gingercake rock in Burke co., a curious pile of stone on a rocky eminence, in the form of an inverted pyramid, commanding a fine view of a ravine from 800 to 1,200 ft. deep. Recent freshets in the Catawba, the Yadkin, and the Dan have exhumed from the "bottoms" relics of curious interest, skeletons, burial urns, various implements and utensils of stone, pottery, and copper, and weapons and personal ornaments. In different parts of the mountain regions are ancient mines of unknown date and origin. The most important one is in Cherokee co., and consists of a vertical shaft 100 ft. deep, lined with skilfully worked timber, with a tunnel extending in to meet it from the foot of the hill. These mines are supposed to be of Spanish origin.—The

climate of the state is as varied as its surface and products. In the low country the atmosphere is warm and humid, and in the mountainous region it is cool and dry. In the interior it partakes somewhat of each extreme, according to locality. The mean annual temperature at Raleigh, lat. $35^{\circ} 47'$, is 60° . At Asheville, Buncombe co., lat. $35^{\circ} 35'$, lon. $82^{\circ} 30'$, the mean temperature of spring is 53.1° , summer 71.7° , autumn 54.8° , winter 38.2° , year 54.45° ; the rainfall in spring is 14.05 inches, summer 16.7, autumn 6.5, winter 8.4, year 45.65.—The soil of North Carolina differs greatly in different parts of the state. In the coast region the swamp lands when drained and the river bottoms are fertile, and rice grows well. The pine region is barren for the most part, while further inland the soil improves, and is well adapted to wheat, rye, barley, oats, and flax. Cotton is chiefly raised in the counties along the S. border. The western and mountainous portion of the state is best adapted to grazing. Among the chief products are sweet potatoes (of which North Carolina produced more in 1870 than any other state), tobacco, and Indian corn. The forest trees of the upland are oak, hickory, ash, walnut, and lime; in the low country, pine; and in the swamps, cedar, cypress, maple, oak, poplar, with an undergrowth of vines. Among the fruits are apples, pears, peaches, plums, cherries, grapes, and strawberries. Grapes are abundant in the coast region. The scuppernong, which is a native of and peculiar to North Carolina, has attracted attention for its large size, luscious flavor, and excellent wine-making qualities. Cranberries are produced in abundance, and are exported. The ginseng, wild ginger, snakeroot, hellebore, spikenard, and other medicinal herbs are exported to the value of about \$250,000 annually. In Albemarle and Pamlico sounds immense quantities of herring and shad in season are taken. The estuaries and bays are favorite resorts of wild fowl of every species. In the forest country in the eastern part of the state, quail, partridges, and other game birds abound; while in the mountainous region of the western portion deer are plenty, and bears and other wild animals are found.—In 1870 the state contained 5,258,742 acres of improved land, 12,026,894 of woodland, and 2,549,774 of other unimproved land. The total number of farms was 93,565; average size, 212 acres. There were 6,744 containing from 3 to 10 acres, 14,257 from 10 to 20, 35,280 from 20 to 50, 22,167 from 50 to 100, 13,819 from 100 to 500, 889 from 500 to 1,000, and 116 of 1,000 and over. The cash value of farms was \$78,211,083; of farming implements and machinery, \$4,082,111; total amount of wages paid during the year, including value of board, \$8,342,856; total (estimated) value of all farm productions, including betterments and additions to stock, \$57,845,940; orchard products, \$394,749; produce of market gardens, \$48,499; forest products,

\$1,089,145; home manufactures, \$1,603,513; value of animals slaughtered or sold for slaughter, \$7,983,132; of all live stock, \$21,993,967. There were 102,763 horses, 50,684 mules and asses, 196,731 milch cows, 45,408 working oxen, 279,023 other cattle, 463,435 sheep, and 1,075,215 swine. The productions were 405,238 bushels of spring and 2,454,641 of winter wheat, 352,006 of rye, 18,454,215 of Indian corn, 3,220,105 of oats, 3,186 of barley, 20,109 of buckwheat, 532,749 of peas and beans, 738,803 of Irish and 3,071,840 of sweet potatoes, 83,540 tons of hay, 144,935 bales of cotton, 2,059,281 lbs. of rice, 11,150,087 of tobacco, 799,667 of wool, 4,297,834 of butter, 75,185 of cheese, 59,552 of flax, 21,257 of maple sugar, 1,404,040 of honey, 109,054 of wax, 35 hogsheads of cane sugar, 62,348 gallons of wine, and 33,888 of cane, 621,855 of sorghum, and 418 of maple molasses.—The most important branch of manufacturing is that of spirits of turpentine, which is produced by distillation from crude turpentine, or the sap of a long-leaved pine (*pinus palustris*). There is an immense extent of territory in North Carolina covered by this species of pine, extending from a point near the line of Virginia across the entire state, and indeed beyond the state to the gulf of Mexico, and varying in width from 30 to 80 m. This belt of land is between the swampy country along the coast and the hilly region of the interior, and consists mainly of a level, sandy barren. Although the "piney woods," as the natives call the turpentine forests, have been settled by Anglo-Saxons about as long as any portion of the United States, yet the roads are very poor, being the merest openings through the woods, and generally without bridges across the streams. The pine trees which cover this tract are from 8 to 18 in. in diameter, with straight trunks which run up 25 to 30 ft. without a limb, at which height their evergreen foliage forms a canopy so dense as to nearly shut out the light of the sky. (See TURPENTINE.) According to the census of 1870, there were 147 establishments engaged in the production of tar and turpentine, with a capital of \$472,100. The products of that year were valued at \$2,338,309, and included 456,131 barrels of rosin, valued at \$861,222; 300 of tar, worth \$820; and 3,799,449 of turpentine, valued at \$1,428,567. North Carolina is the great seat of this industry in the United States. The entire products of the latter in 1870 were valued at \$3,585,225. Of the 6,784,173 gallons of spirits of turpentine, valued at \$2,753,933, exported from the United States during the year ending June 30, 1874, 4,532,388 gallons, worth \$1,793,244, were exported directly from North Carolina. A large portion of the rosin and turpentine exported from the United States is also from North Carolina ports, chiefly Wilmington. During the same year the shipments of rosin and turpentine amounted to 426,395 barrels, valued at \$1,159,022; tar and pitch, 17,660 barrels, worth \$42,824.

The total number of manufacturing establishments in 1870 was 3,642, having 306 steam engines of 6,941 horse power, and 1,825 water wheels of 26,211 horse power, and employing 13,622 hands, of whom 11,339 were males above 16, 1,422 females above 15, and 861 youth. The capital invested amounted to \$8,140,473; wages paid during the year, \$2,195,711; value of materials used, \$12,824,693; of products, \$19,021,327. The leading industries are shown in the following table:

INDUSTRIES.	Number of establishments.	Hands employed.	Capital.	Value of products.
Blacksmithing.....	236	519	\$98,185	\$257,302
Boots and shoes....	121	318	118,979	304,502
Carpentering and building.....	98	272	80,765	208,601
Carriages and wagons.....	130	462	141,785	340,284
Cotton goods.....	28	1,351	968,500	1,280,035
“ thread, twine, and yarn	5	102	62,400	65,017
Flouring and grist-mill products....	1,415	2,660	2,584,520	7,583,133
Lumber, planed....	10	60	53,500	107,070
“ sawed.....	523	2,361	1,175,950	2,000,243
Tar and turpentine.	147	959	472,100	2,333,809
Tobacco, chewing, smoking, and snuffing.....	110	1,464	875,832	717,765
Woollen goods.....	2	150	191,000	183,129
Zinc, smelted and rolled.....	1	17	4,500	522,000

The production of smelted and rolled zinc in North Carolina was nearly half that of the United States. The value of zinc mined in the United States was \$788,880, and in North Carolina \$435,000. The products of fisheries were valued at \$265,839. The production of cotton during 1873-'4 was 57,895 bales; 14,726 bales were consumed in the 30 mills of the state, which had 1,055 looms and 55,498 spindles.—North Carolina contains four United States customs districts, which are indicated in the following statement of foreign commerce for the year ending June 30, 1874, with the number of vessels registered, enrolled, and licensed:

DISTRICTS.	Imports.	Exports.	REGISTERED, &C.	
			Vessels.	Tons.
Albemarle	\$274	.....	60	1,462
Beaufort.....	3,362	\$31,965	98	2,104
Pamlico	3,569	8,643	67	1,412
Wilmington	136,812	3,541,010	67	4,617
Total.....	\$144,017	\$3,581,618	292	9,595

Edenton is the port of entry of the Albemarle district, and New Berne of the Pamlico. The leading foreign exports are turpentine, tar, pitch, and rosin; cotton, tobacco, fish, lumber, and flour are shipped to domestic ports. The entrances and clearances in 1874 were:

DISTRICTS.	ENTERED.		CLEARED.	
	Vessels.	Tons.	Vessels.	Tons.
Albemarle.....	1	99	...	.....
Beaufort.....	2	440	3	1,109
Pamlico	5	389	8	632
Wilmington	211	57,729	278	74,913
Total.....	219	68,657	289	75,654

DISTRICTS.	COASTWISE.			
	Vessels.	Tons.	Vessels.	Tons.
Albemarle.....	185	32,617	7	478
Beaufort.....	19	6,603	12	5,531
Pamlico	179	31,807	80	17,992
Wilmington	299	155,861	201	115,427
Total.....	682	226,888	300	139,428

Fishing is carried on in the sounds and rivers of the coast. The kinds of fish taken are chiefly the herring, shad, bluefish, mullet, and rock. The number of barrels annually packed for market on the sounds is about 100,000.—The state had 87 m. of railroads in 1841, 283 in 1851, 937 in 1861, 1,190 in 1871, and 1,447 in 1874. A large portion of the state debt has been created in aid of railroads. The following table shows the railroads lying wholly or partly within the state, with the termini, the length of the entire road, and the number of miles in operation within the state in 1874:

NAME OF CORPORATIONS.	TERMINI.		Miles in operation in N. C. in 1874.	Total length of line when different from preceding.
	From	To		
Atlantic and North Carolina.....	Goldsboro	Morehead City.....	95	.....
Atlanta and Richmond Air Line	Atlanta, Ga.	Charlotte.....	35	265
Atlantic, Tennessee, and Ohio	Charlotte.....	Statesville.....	47	.....
Carolina Central.....	Wilmington	Rutherford.....	213	272
Charlotte, Columbia, and Augusta.....	Charlotte	Angusta, Ga.....	12	195
Petersburg.....	Petersburg, Va.....	Weldon.....	17	63
Branch.....	Hicksford, Va.....	Gaston.....	5	21
Raleigh and Augusta Air Line	Raleigh	Columbia, S. C.....	44	.....
Raleigh and Gaston.....	Raleigh	Weldon.....	97	.....
Richmond and Danville	Richmond, Va.....	Greensboro	143	46
Leased: Roanoke Valley	Keysville, Va.....	Manson.....	32	53
Northwestern.....	Greensboro.....	Salem.....	25	.....
North Carolina.....	Goldsboro.....	Charlotte.....	223	.....
Seaboard and Roanoke.....	Portsmouth, Va.....	Weldon.....	20	80
Western	Fayetteville.....	Egypt.....	43	.....
Western North Carolina, Eastern Division	Salisbury.....	Asheville.....	114	142
Wilmington, Columbia, and Augusta	Wilmington.....	Columbia, S. C.....	65	189
Leased, Wilmington and Weldon.....	Wilmington.....	Weldon.....	162	.....
Branch.....	Tarboro.....	Rocky Mount.....	19	.....

The Dismal Swamp canal, lying in North Carolina and Virginia, affords communication between Albemarle sound and Chesapeake bay. Important improvements have been made by the Roanoke navigation company in the Roanoke, Dan, and Staunton rivers. A part of these is the Weldon canal, 12 m. long. Improvements in Cape Fear and Deep rivers are also owned by companies. At the beginning of 1875 there were 11 national banks in operation, with a paid-in capital of \$2,200,000; circulation issued, \$2,130,320; outstanding, \$1,824,545. The latter amount was \$1 70 per capita of the population; ratio of circulation to the wealth of the state, $\frac{1}{10}$ per cent.; to bank capital, 82.9 per cent.—The government is administered under the constitution adopted in 1868, which declares that the state shall ever remain a member of the American Union, and that there is no right on the part of the state to secede therefrom; that every citizen owes paramount allegiance to the constitution and government of the United States; that the state shall never assume or pay any debt incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; that slavery and involuntary servitude, otherwise than for crime whereof the parties shall have been duly convicted, shall be and are for ever prohibited; and that no property qualification shall be required as a condition of voting or holding office. The legislative power is vested in a general assembly consisting of a senate of 50 and a house of representatives of 120 members, who are elected by the people for two years. The sessions are biennial, beginning on the third Monday of November in even years. In and after 1876 the state election will be held on the Tuesday after the first Monday in November. The president of the senate and speaker of the house receive each \$7 a day during the session of the legislature, and 20 cents for each mile travelled in going to and returning from the capital. Members receive \$5 a day and mileage. The executive officers are elected for a term of four years, and are as follows: governor, salary \$4,000; lieutenant governor, who is president of the senate; secretary of state, \$1,000 and fees; auditor, \$1,250 and fees; treasurer, \$3,000; superintendent of public instruction, \$1,500; attorney general, \$1,500 and fees. The governor may grant reprieves and pardons after conviction, but has no veto. The executive officers enter upon their duties on the first day of January succeeding their election. The governor and lieutenant governor are ineligible for two successive terms. The secretary of state, auditor, treasurer, and superintendent of public instruction constitute the council of state, which advises the governor in the execution of his duties. The judicial power is vested in a supreme court consisting of a chief justice and four associate justices, a superior court with one judge in each of the 12 judicial districts

into which the state is divided, and courts of justices of the peace. The supreme court has in general only appellate jurisdiction; the superior courts have general original jurisdiction both civil and criminal, and hear appeals from justices of the peace and probate judges; justices of the peace have jurisdiction in civil cases wherein the amount involved does not exceed \$200, provided the title to real estate does not come in question, and of criminal proceedings for minor offences. The clerks of the superior courts act in most matters as probate judges. The judges of the supreme and superior courts are elected by the people for eight years, and receive a salary of \$2,500 each. The elective franchise is conferred upon every male citizen of the United States, 21 years of age and upward, who shall have resided in the state one year next preceding the election, and 30 days in the county in which he offers to vote. A registration of voters is made compulsory. All qualified electors are eligible to office, except persons who shall deny the being of Almighty God, and those who shall have been convicted of treason, perjury, or any other infamous crime, since becoming citizens of the United States, or of corruption or malpractice in office. The property of a married woman remains her own, free from liability for the debts of her husband, and may be devised and bequeathed by her, and with the written consent of her husband conveyed, as if she were single. The grounds for divorce are impotence, abandonment, and living in adultery, "or any other just cause for divorce." North Carolina has two senators and eight representatives in congress, and is therefore entitled to ten votes in the electoral college.—The state debt, on Oct. 1, 1874, including unpaid interest, was:

"Old bonds," issued before the war.....	\$11,379,075
Bonds issued since the war under acts passed before the war.....	3,088,910
Bonds issued during the war for internal improvements.....	1,714,590
Funding bonds issued since the war.....	5,604,140
Bonds not special tax issued under acts passed since the war.....	2,199,208
Bonds commonly called "special tax".....	14,985,980
Total.....	\$38,921,848

Of the above, \$23,985,918 are not special tax. During the year ending Sept. 30, 1874, the receipts of the public fund amounted to \$667,114, and the disbursements to \$451,339. The receipts of the educational fund were \$44,384; disbursements, \$56,030. The valuation of property as reported by the federal census has been as follows:

	Assessed value of real estate.	Personal estate.	Total assessed value.	True value of real and personal estate.
1850..				\$226,800,472
1860..	\$116,366,573	\$175,931,029	\$292,297,602	858,739,399
1870..	83,322,012	47,056,610	130,378,622	260,757,244

In 1874 the total property of the state was reported by the auditor at \$143,723,813, in-

cluding land valued at \$76,959,193; town property, \$16,652,131; horses, mules, cattle, &c., \$18,214,692; farming utensils, money on hand or deposit, solvent credits, &c., \$31,897,797.—The North Carolina institution for the deaf and dumb and the blind, in Raleigh, receives an annual appropriation from the state of about \$40,000. There is an excellent department for colored persons. In 1874 there were 13 instructors, 138 deaf and dumb pupils, including 50 colored, and 77 blind, of whom 14 were colored. The state insane asylum in Raleigh was opened in 1856, and to Nov. 1, 1874, had received 1,087 patients, of whom 247 remained in the asylum at that date. Of those discharged, 275 were cured, 103 improved, 172 unimproved, and 290 died. In 1874 the state contained upward of 600 insane not in any asylum. The capacity of the asylum (245 inmates) is greatly inadequate to the needs of the state. The state penitentiary is also in Raleigh, and contained on Nov. 1, 1874, 445 convicts. They are employed in making brick, clothes, and shoes, but the institution is not self-sustaining.—A fund for the support of common schools was provided for by the legislature in 1825; in 1836 \$1,433,757 was received as a deposit from the general government, and in 1840 the common school system went into operation. In the latter year the general assembly provided for the apportionment of the income of the common school fund, the principal of which amounted to about \$2,000,000, among the several counties according to the white population. The public schools were suspended in 1865 through loss of school funds, and remained closed till about 1870. The constitution of 1868 requires the general assembly to provide for a uniform system of free public schools for all children between 6 and 21 years of age. Each county must be divided into districts in which one or more public schools shall be maintained at least four months in every year; and if the county commissioners fail to comply with this provision, they shall be liable to indictment. The general assembly is empowered to enact that every child of sufficient mental and physical ability shall attend the public schools, during the period between the ages of 6 and 18 years, not less than 16 months, unless educated by other means. The constitution provides for a permanent school fund, and appropriates 75 per cent. of the entire state and county capitation tax to the maintenance of free public schools. Their general supervision is vested in a state superintendent of public instruction, who is elected by the people for four years. County commissioners have control of the public schools in the county, and a school committee of three is elected biennially in each township. The state board of education comprises the governor as president, the superintendent of public instruction as secretary, the secretary of state, treasurer, auditor, and attorney general. The permanent school fund in 1874 was \$2,190,564. The entire revenue for school

purposes amounts to about \$300,000 a year. Whenever this is insufficient to maintain the public schools four months a year in each district in any county, provision is made for the levy of a county tax with the approval of the voters of the county. Substantial aid is also derived from the Peabody educational fund. No distinction is made between white and colored children in the apportionment of school funds, but separate schools are provided. During the year ending June 30, 1873, there were in the state 348,603 children between the ages of 6 and 21 years, of whom 114,852 were colored. Of the whole number, 146,737, including 40,428 colored, attended the public schools an average of 2½ months. The daily average was: white, 70,872; colored, 26,958; total, 97,830. There were 2,565 public schools for white and 746 for colored children. According to the census of 1870, the whole number of persons between the ages of 5 and 18 years was 359,930, of whom 135,845 were colored. The number attending school was 65,801, of whom 11,419 were colored. The number of schools of all classes was 2,161, having 1,739 male and 953 female teachers, and 32,664 male and 32,294 female pupils. The total income for the year ending June 1, 1870, was \$635,892, being \$9,160 from endowment, \$232,104 from taxation and public funds, and \$394,628 from other sources, including tuition. North Carolina has no state normal schools; but the Ellendale teachers' institute at Ellendale Springs, and the Williston academy and normal school in Wilmington, afford professional instruction to teachers.—The university of North Carolina, chartered in 1789, is at Chapel Hill, 28 m. W. of Raleigh, where it has valuable property and a library containing about 25,000 volumes. Its alumni number upward of 1,700. Since 1871 the institution has been suspended for financial reasons. In 1873 a constitutional amendment was adopted providing for its reorganization. Trinity college, at Trinity, about 100 m. W. of Raleigh, is under the control of the Methodist Episcopal church, South, but is not sectarian. The system of instruction comprises 13 courses, viz.: Latin, Greek, mathematics, English literature, natural science, mental and moral philosophy, modern languages, theology, engineering and architecture, analytical chemistry, and law. Theology or law may be studied exclusively; of the other courses the student may take any three. In 1873-'4 there were 6 instructors and 122 students, of whom 71 were pursuing academic, 15 theological, 16 law, 23 scientific, and 18 preparatory studies. The library contained 9,000 volumes. Davidson college (Presbyterian), at Davidson, Mecklenburg co., 23 m. N. of Charlotte, was organized in 1837, and in 1873-'4 had 7 instructors and 117 students. There is a classical course of four and a scientific course of three years, besides an eclectic course. The institution has a library of 7,000 volumes, and valuable cabinets and apparatus. North Caro-

lina college (Lutheran), at Mt. Pleasant, organized in 1859, has collegiate, preparatory, and theological departments. In 1873-'4 there were 6 instructors and a total of 115 students. Wake Forest college (Baptist), at Forestville, Wake co., has preparatory, collegiate, and commercial departments. In 1873-'4 there were in all departments 7 instructors and 80 pupils. The institution is well endowed, and has a library of 8,000 volumes. Rutherford male and female college (non-sectarian), opened in 1871 at Excelsior, in 1873-'4 had 11 instructors and 216 pupils, of whom 42 were females. Indigent orphans and children of ministers may receive instruction free of charge. The state contains 11 institutions for the superior instruction of women, which in 1873-'4 had about 100 instructors and upward of 1,000 pupils.—The total number of libraries reported by the census of 1870 was 1,746, with 541,915 volumes. Of these, 1,090, containing 339,264 volumes, were private, and 656, with 202,651 volumes, other than private; among the latter were 3 state libraries, with 16,303 volumes; 3 town, city, &c., 2,316; 24 court and law, 4,119; 14 school, college, &c., 77,050; 500 Sabbath school, 74,160; 109 church, 26,951; and 3 circulating, 1,752. The total number of newspapers and periodicals was 64, having an aggregate circulation of 64,820, and issuing 6,684,950 copies annually. Of these, 8 were daily, with a circulation of 11,795; 3 tri-weekly, 800; 5 semi-weekly, 5,750; 44 weekly, 43,325; 1 semi-monthly, 1,250; and 3 monthly, 1,900. In 1874 there were reported 10 daily, 3 tri-weekly, 3 semi-weekly, 80 weekly, 2 semi-monthly, and 4 monthly; total, 102. The total number of religious organizations in 1870 was 2,683, having 2,497 edifices, with 718,310 sittings and property valued at \$2,487,877. The denominations were represented as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Property.
Baptist, regular.....	951	910	243,920	\$578,050
" other.....	84	23	5,845	5,235
Christian.....	66	60	16,200	24,377
Congregational.....	1	1	150	1,500
Episcopal, Protestant.....	77	68	22,935	408,450
Friends.....	28	27	11,250	21,485
Jewish.....	1	1	200	500
Lutheran.....	73	70	28,290	96,550
Metho ^d ist.....	1,193	1,073	300,045	775,805
Moravian (Unitas Fratrum).....	10	10	3,300	81,000
Presbyterian, regular.....	155	152	69,205	375,200
" other.....	19	19	7,950	20,275
Reformed church in the United States (late German Reformed).....	81	29	9,300	23,400
Roman Catholic.....	10	9	3,300	64,100
Universalist.....	2	2	600	700
Unknown (local missions).....	...	1	300	15,000
Unknown (union).....	2	2	500	1,250

—The first attempt at settlement in North Carolina was made on Roanoke island in 1585 by a party of 108 persons under Ralph Lane, sent out by Sir Walter Raleigh. They quarrelled with the Indians, and returned the following year with Sir Francis Drake's fleet. The year previous to this settlement (1584)

Raleigh, having received from Queen Elizabeth a grant for such lands as he might discover in America, "not possessed by any Christian people," sent out two small vessels, which made the land at Cape Fear, coasted north for a harbor, and finally, early in July, ran into Ocracoke inlet, and landed on an island called by the natives Wococon, where they were hospitably received. After slight explorations they bestowed the name of Virginia upon the region, and returned to England with a highly favorable account of the country, which induced the expedition of 1585. Other colonists were sent out by Raleigh the same year, and the year following, who are supposed to have fallen victims to the Indians; and no further attempts were made to colonize the country till about the middle of the 17th century. In 1663 Charles II. formed the province of Carolina, which he granted to eight noblemen. This grant was bounded S. by lat. 29°, W. by the Pacific ocean, N. by lat. 36° 30', and E. by the Atlantic. The grantees were made joint proprietors and vested with jurisdiction over the colonists. Previous to this grant a few settlements had been made in the N. part of the province, near Albemarle sound, by dissenters from Virginia, and a little colony had been planted near the mouth of Cape Fear river by New Englanders, which was subsequently abandoned. The philosopher John Locke wrote a scheme of government for the whole province, which was nominally its fundamental law for about 25 years, but which was so complicated and cumbersome as never to be completely carried out. Albemarle, the name then given to what now constitutes North Carolina, was augmented by settlement from Virginia, New England, and Bermuda. In 1674 the population was about 4,000, and the annual product of tobacco 800,000 lbs. Thomas Cary was appointed governor in 1705, but was removed to give place to Edward Hyde; whereupon Cary, to retain his position, incited a rebellion, and at the head of an armed force attacked Edenton, but was repulsed, and finally, by the aid of regular troops from Virginia (1711), the rebellion was suppressed. Meanwhile the province was involved in a war with the savages. The Tuscaroras began a war of extermination; but by the assistance of neighboring colonies this tribe was subdued (1713), and finally emigrated to the north. Other hostile tribes were also reduced to subjection. In 1717 the number of taxable inhabitants did not exceed 2,000, having gained no more than 600 since 1676. In July, 1729, during the administration of Gov. Everard, Carolina became a royal government, the king having purchased from the proprietors seven eighths of their domain; the remaining eighth was retained by Lord Carteret, who surrendered his right of jurisdiction, but not of soil. North and South Carolina now became distinct provinces. In 1765 North Carolina had gained considerable accessions to its popula-

tion from a colony of Presbyterians from the north of Ireland, who settled in the N. W. part of the state, a party of Moravians who settled between the Yadkin and Dan rivers, and a party of highlanders who located near Fayetteville. In 1769 the assembly declared against the right of Britain to tax North Carolina while unrepresented in parliament, and was accordingly dissolved by Gov. Tryon. North Carolina sent representatives to the first continental congress, September, 1774, and united in adopting the declaration of colonial rights. An association for the defence of those rights was formed in Mecklenburg co., which in May, 1775, formally renounced allegiance to the crown, and published a declaration of independence; but this feeling was not general, and counter-combinations were formed to sustain the royal authority. Alarmed at the threatening state of affairs, Gov. Martin retired on board a man-of-war in Cape Fear river, July 17, 1775. A convention was held, Aug. 20, which authorized the raising of three regiments of troops, which were subsequently increased to five, and taken into pay by congress. A proclamation was issued by Gov. Martin from on board ship forbidding their meeting, which the convention denounced as scandalous and scurrilous, and ordered it to be burned by the hangman. The loyalists were quite strong, especially among the "regulators" and highlanders. A body of 1,500 loyalists, under McDonald and McLeod, who had been commissioned by Martin, attempted to reach the coast and join Gen. Clinton, but were met by the patriots under Caswell and Moore, and routed with the loss of McLeod and 850 prisoners, including McDonald. In April, 1776, the North Carolina convention authorized their delegates to unite with the other colonies in a declaration of independence. North Carolina ordered four more regiments to be raised, and the loyal highlanders and regulators to be disarmed. In December, 1776, the province adopted a state constitution, and elected Richard Caswell as governor. The colony furnished her quota of men, but, beyond the partisan warfare between the patriots and loyalists, was not the scene of important military operations till 1780. The battle of Guilford Court House, fought March 15, 1781, between Gen. Greene and Cornwallis, was the chief event of the war within this state. The constitution of the United States, formed in 1787, was rejected by North Carolina in 1788, but finally adopted in 1789.—The popular sentiment in North Carolina at the beginning of 1861 was in favor of the Union, and at an election held Feb. 28 the people voted by a small majority not to call a convention for considering the question of secession. But after the attack on Fort Sumter, Gov. Ellis raised troops, seized Forts Caswell and Johnston, which formed the defences of Wilmington, and Fort Macon in the harbor of Beaufort, and took possession of the mint at Charlotte

and the arsenal at Fayetteville. A convention having been called by the legislature, which had convened in extra session on May 1, an election of delegates was held on May 13, and on the 20th, the 86th anniversary of the Mecklenburg declaration of independence, the convention assembled in Raleigh. On the following day the ordinance of secession was passed and the confederate constitution was ratified. These measures were not submitted to the people. Delegates were also chosen to the confederate congress. On Aug. 29, 1861, an expedition under Commodore S. H. Stringham and Gen. B. F. Butler, consisting of three 50-gun frigates with four smaller vessels and two steam transports, carrying 800 soldiers, captured Forts Hatteras and Clark, which commanded the entrance to Pamlico sound. On Feb. 8, 1862, an expedition under Commodore Goldsborough and Gen. Burnside, consisting of more than 100 vessels and 11,500 troops, captured Roanoke island, with 6 forts, 40 guns, and 2,000 prisoners; and thence operations were directed against other important points. Before the close of the month, Elizabeth City, Edenton, and Winton were taken. New Berne was captured on March 14, and Morehead City and Beaufort were next occupied without resistance. Fort Macon, guarding Beaufort harbor, surrendered on April 26 after a bombardment, and Washington, Plymouth, and other towns on the coast were occupied by the Union forces. Plymouth was recaptured by the confederates in April, 1864, with 1,600 men and 25 guns, but was recovered by the Unionists on Oct. 31. Wilmington, a favorite resort of the blockade runners, was the next point of attack. In 15 months (October, 1863, to December, 1864) 397 vessels ran the blockade at this port; the amount of cotton exported from January, 1863, to October, 1864, was 137,937 bales; and the export and import trade during the year ending June 30, 1864, was \$65,185,000. Fort Fisher, the chief defence of the city, was bombarded by Admiral Porter, Dec. 24, 1864, but the land forces under Gen. Butler being unable to coöperate, the attack failed. Another attempt by Porter and Gen. Terry, Jan. 15, 1865, resulted in the surrender of the fort and the other defences of Cape Fear river. Wilmington was taken by Gen. Schofield, Feb. 22, and Goldsboro on March 21, Kingston having been occupied on the 14th. At Goldsboro Schofield was soon joined by the army of Gen. Sherman, which had defeated the confederates under Hardee at Averysboro and those under J. E. Johnston at Bentonville. Raleigh was occupied on April 13, and on the 26th hostilities were ended by the surrender of Gen. Johnston's army. On May 29, 1865, President Johnson appointed W. W. Holden provisional governor. Delegates to a convention were elected on Sept. 12, and having assembled in Raleigh, Oct. 2, adopted resolutions declaring the ordinance of secession null, abolishing slavery, and repudiating the state debt

created in aid of the rebellion. An election for governor and members of congress and the state legislature was held on Nov. 9, when also the resolution declaring the secession ordinance void, and that abolishing slavery, were ratified by the people. The legislature assembled on Nov. 13, and subsequently ratified, with six dissenting voices, the amendment to the federal constitution abolishing slavery. On Dec. 23 the provisional governor was succeeded by the newly elected governor Worth. According to adjournment, the convention reassembled on May 24, 1866, and adopted amendments to the constitution, which were rejected by the people at an election held Aug. 2. The government of North Carolina as thus reorganized did not meet the approval of congress, nor were the representatives of the state admitted to that body. Pursuant to the reconstruction act of congress, passed March 2, 1867, providing a military government for the southern states, North and South Carolina were constituted the second military district, under command of Gen. D. E. Sickles, who was instructed to take the necessary measures for assembling a convention to reorganize the state government. Gen. Sickles entered upon his duties on March 21, with his headquarters in Columbia, S. C., but was superseded by Gen. Canby, who assumed command on Sept. 5. A registration of those persons qualified to vote under the reconstruction acts of congress was begun in August and completed before the middle of October, when 103,060 white and 71,657 colored voters had been registered. The election was held on Nov. 19 and 20, when a vote was taken on the question of "convention" or "no convention," and also for delegates to the convention in case of holding one. The total number of votes cast was about 130,000, of which 60,000 were those of colored persons; about 90,000 votes were cast for the convention. That body having assembled on Jan. 14, 1868, the present constitution was framed; and it was ratified by the people on April 21-23. The whole number of votes registered was 196,876, of whom 117,431 were white and 79,445 colored; 93,118 votes were cast in favor of the constitution, and 74,009 against it. At the same election state officers, members of the legislature, and representatives to congress were chosen. The new constitution having been approved by congress, a law was passed, June 25, 1868, entitling North Carolina with other states to representation in congress upon the ratification by their legislatures of the fourteenth amendment to the federal constitution. The legislature assembled on July 1, and on the following day ratified the amendment. On the 4th Gov. Holden was formally inaugurated, and on the 11th a proclamation was issued by the president announcing that North Carolina had complied with the condition prescribed by congress for her restoration to the Union. The fifteenth amendment to the federal constitution was ratified March 4, 1869, by a vote of

40 to 8 in the senate and 87 to 20 in the house. During 1869 and 1870 the peace of the state was seriously disturbed by outrages alleged to have been committed by masked outlaws belonging to a secret organization known as the Ku-Klux Klan. On March 7 Gov. Holden declared martial law in Alamance county, and subsequently in Caswell county, which continued in both counties until Nov. 10. For these acts articles of impeachment were preferred against him on Dec. 14, which resulted in his conviction. (See supplement.)

NORTHCOTE, James, an English painter, born in Plymouth, Oct. 22, 1746, died July 13, 1831. He was the son of a watchmaker, with whom he served an apprenticeship, and subsequently devoted himself to painting. In 1771 he became a pupil of Sir Joshua Reynolds, and from 1777 to 1780 he studied in Italy. After his return he was occupied in portrait painting until the establishment of Alderman Boydell's "Shakespeare Gallery," for which he executed various pictures, the best of which are "Prince Arthur and Hubert," "The Murder of the Princes in the Tower," "The Death of Wat Tyler," and "The Entry of Bolingbroke and Richard II. into London." In 1787 he was elected an academician. He was subsequently eclipsed in portraiture by Lawrence and other artists, and his harsh criticisms of the works of his contemporaries made him exceedingly unpopular. He published "Life of Sir Joshua Reynolds" (4to, London, 1813; with supplement, 1815; 8vo, enlarged, 1819), valuable chiefly for the sayings and anecdotes of Reynolds; "Life of Titian" (2 vols., 1830), the joint production of himself and Hazlitt; and two volumes of fables, of which the first, entitled "One Hundred Fables" (1828), contained original and selected pieces, with illustrations of his own, and the second, also illustrated by himself, was published after his decease under the title of "The Artist's Book of Fables."

NORTHCOTE, Sir Stafford Henry, an English statesman, born in London, Oct. 27, 1818. He graduated at Oxford in 1842, and was called to the bar in 1847. He succeeded as eighth baronet on the death of his grandfather in 1851, and in the same year was made a C. B. for his services as a secretary of the crystal palace exhibition. He became a member of parliament in 1855; was private secretary of Mr. Gladstone when the latter was president of the board of trade; financial secretary to the treasury from January to June, 1859; president of the board of trade from July, 1866, to March, 1867, and afterward secretary of state and president of the council for India till December, 1868; governor of the Hudson Bay company in 1869; and a member of the high joint commission at Washington on the Alabama claims in 1871. In March, 1874, he joined Mr. Disraeli's cabinet as chancellor of the exchequer. He has published "Twenty Years of Financial Policy, 1842-'61" (London, 1862).

NORTHERN LIGHTS. See AURORA BOREALIS.

NORTHMEN, and **Normans**, names usually given, the former especially to the ancient and mediæval inhabitants of Scandinavia, or Denmark, Norway, and Sweden, and the latter to that portion of them who conquered and settled in Normandy. From the year 787 the Danes made incursions along the English coast. In 851 they wintered in England, and in the reign of Ethelred a footing was established; and they finally ruled England for more than 30 years. As early as 852 the Scandinavians had a king in Dublin, and there were princes of the same race governing petty sovereignties at Waterford and Limerick. The Shetland isles, the Orkneys, and the Hebrides were early conquests of the Northmen. Scotland was visited by them at different times between the 8th and 11th centuries. Iceland was discovered by the Northmen in 860, and settled in 874. In 876 or 877 Greenland was discovered, and a colony was planted there by Eric the Red in 983-5. (See ICELAND, and GREENLAND.) This led, according to the Icelandic sagas, to the discovery of the mainland of America by Bjarni, son of Herjulf, in the year 986. About 1001 Leif, son of Eric the Red, set sail with 35 men to pursue the discovery of Bjarni. He visited first an island seen by Bjarni, and named it Helluland (Flat-stone Land), supposed to be Newfoundland; next Markland (Wood Land), supposed to be Nova Scotia; and last Vinland (Vine Land), supposed to be the coast of New England. Leif built houses and wintered in Vinland, and in the spring loaded his vessel with timber and returned to Greenland. About 1002 Leif's brother Thorvald went to Vinland with 30 men, and wintered at the same place, which is supposed to have been on Mount Hope bay, Rhode Island. In the succeeding year he sent a party to examine the coast, who were gone all summer. In 1004 he himself explored the coast eastward, and was killed in a skirmish with the natives; and in 1005 his companions returned to Greenland. In the spring of 1007 Thorfinn Karlsefni, a rich Iceland, set sail for Vinland with three ships, 160 men, and some cattle. He passed three winters on the coast of Massachusetts, where his wife bore a son, Snorri; but finally, finding the natives hostile, he went back. The old Icelandic manuscripts make mention of visits to Vinland or to Markland in 1121, 1285, and 1347. The truthfulness of the sagas is confirmed by Adam of Bremen, almost contemporary with the voyage of Thorfinn, who states, on the authority of Sweyn Estrithson, king of Denmark, that Vinland received its name from the vines which grew wild there. The latest documentary evidence in relation to the intercourse between Greenland and America is the Venetian narrative of the visit of Nicolò Zeno, about 1390, to Greenland, where he met with fishermen who had been on the coast of America. (See ZENO.)—In Russia the Northmen were called Varangians, or sea rovers. Rurik, a Northman,

occupied Novgorod in 862, and founded the dynasty which gave sovereigns to Russia until 1598. About 865 the Varangians appeared with a fleet before Constantinople; and it was not until an alliance made between Vladimir the Great, who adopted Christianity, and the Greek emperor (988) that the incursions ceased. Soon afterward a Varangian body guard was adopted at Constantinople, and from this time until the fall of the eastern empire the Byzantine sovereigns trusted their lives to no other household troops. The *Codex Flateyensis* of Iceland gives the number of the Varangian guard in the 11th century at 300. Among the antiquities in the museum of Christiania are Byzantine coins of 842-67, found in ploughing the fields of Aggerhuus in Norway.—A Danish invasion penetrated to the Meuse in 515, and was repelled. Gottfried, king of Jutland, ravaged the French and Spanish coasts, even within the strait of Gibraltar. Their great invasion of France, however, was delayed until after 841; from which period the whole coast of western Europe from the Elbe to the Guadalquivir was a prey to the Northmen. In 837 they had sacked Utrecht and Antwerp, and fortified themselves on the island of Walcheren. Rollo devastated Holland, and appeared upon the Seine, while Gottfried ravaged the valleys of the Meuse and Scheldt. They burned and sacked Cologne, Bonn, Treves, Metz, and other cities, stabling their horses at Aix-la-Chapelle in the cathedral church of Charlemagne. *A furore Normannorum libera nos, Domine*, came to be part of the Catholic litany. Hasting, at the head of a band of Northmen, sacked Bordeaux, Lisbon, and Seville; defeated the Moorish conquerors of Spain at Cordova; crossed the straits into Morocco; overran Tuscany; returned to France, and embraced Christianity. With safe winter quarters in Spain, they extended their ravages to Naples, Sicily, and the coasts of the Greek empire, and in the autumn of 885 laid siege to Paris. At last King Charles the Fat bought off the Northmen with 700 pounds of silver, and a free passage to the upper Seine and Burgundy. The most redoubtable of the Northmen afterward was Hrolf, better known as Rollo, first duke of Normandy, and direct ancestor in the sixth generation of William the Conqueror. From Charles the Simple he accepted the hand of a daughter, together with a tract of Neustrian territory N. of the Seine from Les Andelys to the sea (the N. E. portion of modern Normandy), in exchange for Christian baptism and an oath of fealty (912). Rollo distributed among his followers the lands of Neustria, to be held of him as duke of Normandy. Thus were laid the foundations of the feudal system which William transplanted into England (1066-87). The Normans adopted the language of the vanquished province, but greatly modified it. It was the *langue d'oïl* (the *langue d'oc* being south of the Loire), which became the peculiar medium of romantic poetry.

NORTH RIVER. See HUDSON RIVER.

NORTH SEA, or **German Ocean** (called the West sea by the Danes), an extensive arm of the Atlantic, which lies between Great Britain and the continent of Europe, extending from lat. 51° to 62° N., and lon. 4° W. to 8° E.; greatest length about 700 m., breadth 400 m. It has the Atlantic ocean on the north; Norway, Denmark, Germany, the Netherlands, Belgium, and the N. extremity of France on the east and southeast; the strait of Dover on the southwest, by which it communicates with the English channel; England, Scotland, and the Orkney islands on the west; and the Shetland islands on the northwest. The shores are indented by numerous bays, inlets, and estuaries, the chief of which are the fiords of Bømmel, Bukke, and Flekke on the coast of Norway; the Skager Rack, which communicates through the Cattegat with the Baltic; the fiords of Liim, Nissum, and Rinkjöring or Stavning, and the estuary of the Varde river in Denmark; the estuaries of the Eider, Elbe, and Weser in Germany; the Zuyder Zee and the mouths of the Maas and Scheldt in Holland; the estuaries of the Thames, Humber, and the Wash in England; and the friths of Forth, Tay, and Moray in Scotland. Besides the Orkneys and the Shetlands there are many other islands, all on the coasts of Norway, Denmark, Germany, and Holland. The most important are Great Sartorö, Bømmelö, and Karmö, in Norway; Fanö and Manö in Denmark; Römö, Sylt, Föhr, Amrum, Nordmarsch, Hooge, Pellworm, Nordstrand, Neuwerk, Wangeroog, Spiekeroog, Langeroog, Baltrum, Nordeney, Juist, Borkum, and several smaller in Germany; Heligoland, which belongs to England, opposite the mouth of the Elbe; Rottum, Schiermonnikoog, Ameland, Ter Schelling, Vlieland, Texel, and the islands formed by the deltas of the Maas and Scheldt, in Holland. The Bell rock and May rock, on each of which there is a lighthouse, are the only islands of the North sea on the coast of Great Britain. Floating lights have been established on several banks, and there are lighthouses at all the principal points and ports on its coasts. The average depth of the sea is about 30 fathoms, but toward the Norwegian side the soundings increase to 190 fathoms. The North sea is traversed by several extensive banks. The Dogger bank, which is the principal, lies near the middle, between lat. 54° and 55° ; the Fisher bank is its N. extension, between lat. 56° and 58° ; another bank extends 110 m. in a N. E. direction from the frith of Forth, and one runs 105 m. N. W. from Denmark. The tidal wave which comes from the Atlantic passes along the W. coasts of Great Britain and Ireland, and enters the North sea by its N. extremity, continuing to rule the tides as far S. as the N. end of the strait of Dover, and, through this strait, to be felt in some degree in the English channel. On the N. coast of Scotland the rise is about 12 ft., and it increases, according to the figure of the

shore, to 20 ft. at the Humber and 18 at Dover. The portion of the tidal wave which is intercepted by the English channel as it comes from the south passes directly through that channel, and meets the tide of the North sea about the N. extremity of the strait of Dover; and when the two floods meet, the southern is half a day earlier than the northern; or, in other words, the north wave is part of the tide preceding the one from the south which it meets; that time, and the interval taken by the tide in passing through the English channel, in all about 18 hours, being occupied by the tidal wave in making the complete circuit of Great Britain.—Several thousand people are occupied in the fisheries in the North sea, and the quality of the fish has long been celebrated. The chief kinds taken are cod, ling, hake, turbot, soles, different sorts of flat fish, lobsters, and immense quantities of mackerel and herrings.

NORTHUMBERLAND. I. An E. central county of Pennsylvania, bounded W. by the Susquehanna river and its W. branch, and intersected by the N. branch; area, about 500 sq. m.; pop. in 1870, 41,444. The surface is mountainous, but between the ranges lie broad and fertile valleys. Canals run along the N. and W. branches, and the county is intersected by the Philadelphia and Erie, Northern Central, Philadelphia and Reading, and other railroads. The chief productions in 1870 were 335,264 bushels of wheat, 37,526 of rye, 510,418 of Indian corn, 463,634 of oats, 25,139 of buckwheat, 227,658 of potatoes, 15,759 lbs. of wool, 486,128 of butter, and 25,831 tons of hay. There were 5,406 horses, 6,117 milch cows, 4,896 other cattle, 5,602 sheep, and 12,495 swine; 12 manufactories of brick, 12 of earriages and wagons, 1 of cars, 17 of clothing, 14 of furniture, 13 of iron forged, cast, &c., 27 of lime, 8 of machinery, 13 of saddlery and harness, 17 of tin, copper, and sheet-iron ware, 20 flour mills, 7 planing mills, 19 saw mills, 26 tanneries, and 19 currying establishments. Capital, Sunbury. **II.** An E. county of Virginia, at the mouth of the Potomac, bounded E. by Chesapeake bay; area, about 200 sq. m.; pop. in 1870, 6,863, of whom 3,054 were colored. It has an undulating surface and a moderately fertile soil. The chief productions in 1870 were 20,061 bushels of wheat, 158,483 of Indian corn, 22,871 of oats, 8,210 of Irish and 10,185 of sweet potatoes, 3,507 lbs. of wool, 19,860 of butter, and 1,368 gallons of sorghum molasses. There were 703 horses, 1,178 milch cows, 3,046 other cattle, 1,794 sheep, and 4,702 swine. Capital, Heathsville.

NORTHUMBERLAND. I. A county of Ontario, Canada, bordering S. on Lake Ontario; area, 743 sq. m.; pop. in 1871, 39,086, of whom 13,349 were of Irish, 13,271 of English, 6,153 of Scotch, 3,313 of German, 1,498 of Dutch, and 901 of French origin. Rice lake, a considerable body of water, is on the border of the county, and several streams flow into Lake Ontario. It is traversed by the Grand Trunk

and the Cobourg, Peterborough, and Marmora railways. Capital, Cobourg. **II.** A N. E. county of New Brunswick, Canada, bordering on the gulf of St. Lawrence; area, 4,760 sq. m.; pop. in 1871, 20,116, of whom 8,009 were of Irish, 6,895 of Scotch, 3,002 of English, and 1,377 of French origin. It is drained by the Miramichi river and its branches, is heavily timbered, and has a diversified surface. Its commerce is important. Capital, Newcastle.

NORTHUMBERLAND, the northernmost county of England, bounded N. W. by Scotland, from which it is partly separated by the river Tweed, E. by the North sea, S. by Durham and Cumberland, and W. by Cumberland; area, 1,952 sq. m.; pop. in 1871, 386,646. In the west it is mountainous, being covered by the Cheviot hills; but along the coast it is level, with a highly fertile soil. The Tyne, Blyth, Coquet, Aln, Till, and Tweed are the principal streams. The county contains vast quantities of coal, frequently found together with limestone, lead ore in the mountains to the southwest, iron ore in various parts, and many excellent qualities of stone. The principal agricultural products are wheat, oats, and barley; and the science of agriculture has been so highly developed that it has become a school to which many resort. Coal and iron are the bases of most of the manufacturing operations. Interesting remains of the Roman era exist, and there are many ruined castles. The principal towns are Newcastle, the chief centre of trade, Tynemouth, North Shields, Morpeth, and Alnwick, the capital.

NORTHUMBERLAND, Dukes of. See DUDLEY, and PERCY.

NORTHWESTERN UNIVERSITY, an institution of learning situated at Evanston, Ill., 12 m. N. of Chicago. The university grounds consist of about 30 acres on the shore of Lake Michigan. The principal buildings are university hall, which contains the chapel, library, museum, and recitation rooms, Heck hall or college of theology, and the woman's college of literature and art. The university, which is in charge of the Methodist Episcopal denomination, embraces the following faculties: 1, college of literature and science; 2, college of technology, founded in 1873; 3, college of literature and art, formerly the Evanston college for young ladies, which was united with the university in 1873; 4, conservatory of music; 5, college of theology, or Garrett Biblical institute, established in 1856; 6, college of law, established in 1873 in conjunction with the university of Chicago, the two institutions agreeing to unite in the maintenance of the Chicago law school; 7, college of medicine, begun in 1869, when the Chicago medical college became a part of the university; 8, preparatory school. The library contains about 30,000 volumes, 20,000 of which formerly constituted the private library of Dr. Johannes Schulze of the Prussian ministry of public instruction, purchased and presented to the university in 1870 by Luther

L. Greenleaf of Evanston. The library has a fund of \$60,000, the interest of which is to be added to the principal until a sum sufficient to erect a fire-proof building is secured. The



University Hall.

museum comprises about 15,000 specimens. Every course of study is open to both sexes. The university was chartered Jan. 28, 1851, and formally opened Nov. 1, 1855. Its presidents have been as follows: Clark T. Hinman, D. D., 1853-'5; R. S. Foster, D. D., 1856-'60; Henry S. Noyes (acting), 1860-'69; E. O. Haven, D. D., 1869-'72; and C. H. Fowler, D. D., 1872. In 1874 there were in all the departments 62 professors, instructors, and lecturers, and 866 students, of whom 212 were in the academical school, 403 in the preparatory school, 166 in the theological school, and the remainder distributed among the other schools.

NORTHWEST PASSAGE. See ARCTIC DISCOVERY, and POLAR SEAS.

NORTHWEST PROVINCES, a political division of British India, comprising a long and irregular strip of territory lying between lat. 23° 51' and 31° 10' N., and lon. 77° and 84° 45' E., immediately W. of Bengal. It adjoins Nepal on the southern and western frontiers of that country, except where the province of Oude intervenes, which is enclosed by the Northwest Provinces on all sides but the northern Gurwhal and the Himalaya mountains form the northernmost limits of the division; the western boundaries are the Punjab, Rajpootana, and Gwalior; and the southern border is formed by Bundelcund and Rewah. Its name does not accurately describe its position, for it occupies about the centre of the N. part of India. Area, 80,901 sq. m.; pop. in 1872, 30,769,056, distributed as follows among the seven administrative commissionerships of the territory: Meerut, 4,973,190; Kumaon, 743,170; Rohilcund, 5,435,550; Agra, 5,038,-

136; Jhansi, 934,747; Allahabad, 5,466,116; Benares, 8,178,147. Of these, 26,569,068 were Hindoos, 4,189,348 Mohammedans, and 10,640 Christians. The density of the population, 380 to the square mile, exceeds that in any other large division of India except Oude, where there are 465 to the square mile. The commissionerships are subdivided into 35 districts, and in 1872 contained 91,226 villages. At that time the area of the subject-allied native states under the supervision of the provincial government was 5,390 sq. m., with an estimated population of 1,284,691.—Although the northern portions, situated within the Himalaya region, are broken by spurs of the great snowy range, the Northwest Provinces lie chiefly in the rich Gangetic plain, and are watered by the Ganges and Jumna and their affluents, which here flow through an exceedingly fertile and prosperous region, dotted with wealthy, famous, and powerful cities, and abounding in historical interest. The tract between the Ganges and the Jumna, known as the Doab, is occupied by one of the most extensive and important systems of artificial irrigation in the world, of which the Ganges canal is the chief work, supplying water in 1871-'2 to an area of about 800,000 acres. The principal forests are in Jhansi and near the foot of the Himalaya in Gurwhal and Kumaon, and are under the care of the government forest conservancy. The chil (*pinus excelsa*), the chir (*pinus longifolia*), the saul tree, and the deodar are the chief timber trees. Immense numbers of bamboos are obtained from the bamboo forests in the north. There are but few trees in the lower country. The climate is dry from April to June, when the rains begin, but the annual rainfall averages very little more than 30 inches. Opium, indigo, sugar cane, and the cereals are cultivated in the plains; there is a cotton farm at Bulundshuhur; and tea is grown in Gurwhal, Kumaon, and the district of Dehra Doon. Mines of lead and copper occur in the north, and iron also has been found in Kumaon, but the ore cannot be worked profitably.—The Northwest Provinces are traversed by the East Indian and Delhi railways, together forming the great trunk line between Calcutta and Lahore. On April 1, 1873, there were 839½ m. of railway in operation within the provincial limits. The whole opium crop is sent to the government depot at Ghazepoor, near Benares, and considerable quantities of cocoanuts are exported to other parts of India. The manufacture of cotton goods is an important industry, but most of the supply is required for home consumption. A proprietary system of land revenue prevails, the principle of which is derived from a settlement made by the emperor Akbar. The cultivators of the soil pay rent to the proprietors of the villages, from whom the government exacts a portion as a tax, now amounting to one half of the assumed rental. These proprietors are usually the members of a family who own a village, all the villagers being their

tenants. In 1871-'2 the net land revenue was £3,682,588, and £414,501 were derived from the duty on salt, £216,868 from excise duties, and £79,174 from income tax; the total revenue in 1872-'3 was £5,849,714, and the expenditure was £2,083,562.—The executive authority is vested in a lieutenant governor, appointed by the viceroy with the approval of the secretary of state for India. A high court of judicature, consisting of a chief justice and five puisne judges, is the chief judicial tribunal. There are 67 regularly organized municipalities. Among the more important cities and towns are Allahabad, the capital, Agra, Bareilly, Benares, Cawnpore, Furruckabad, Ghazepoor, Goruckpoor, Meerut, and Muttra. The total number of educational institutions in 1872 was 8,938, at which there was an average daily attendance of 180,898 pupils. These included seven colleges affiliated to the Calcutta university, all of which received assistance from the government, while four were directly under its control, 35 high schools, and 13 normal schools. Under British rule, elementary education has made greater progress here than elsewhere in India. Separate statistics are wanting as to the Protestant mission schools of the Northwest Provinces alone, but in 1872 the entire number there and in Oude was 335, with an attendance of 16,609 students; while there were 7,779 native Christian converts distributed throughout the same territory. At Agra there is a medical college. A prosperous native literature exists, comprising books, magazines, and newspapers in Urdu, Hindee, and other languages; during 1871-'2, 30 native newspapers and 9 magazines were regularly published, a majority of them in Urdu; and of the 317 books which appeared in 1871, 90 were in Urdu, 56 in Persian, 53 in Hindee, 47 in Arabic, and 33 in English.—The Northwest Provinces were formerly included in the presidency of Fort William in Bengal, but in 1833 they were constituted a separate administrative division, with the capital at Agra. During the sepoy mutiny they were the principal theatre of war. (See INDIA.) In 1862 the seat of government was removed to Allahabad.

NORTHWEST TERRITORIES, a portion of the Dominion of Canada, comprising the greater part of the former Hudson Bay territory, bounded N. by the Arctic ocean and Hudson strait, and E. by the portion of Labrador belonging to Newfoundland and by Quebec. On the south it has for its boundary, E. of the Rocky mountains, Quebec, Ontario, the United States, Manitoba, and again the United States (along the parallel of 49° N.); and W. of that range, British Columbia along the parallel of 60°. Its W. boundary, S. of the 60th parallel, is formed by the Rocky mountains, separating it from British Columbia, and N. of that line by Alaska, along the meridian of 141° W. Its E. extremity is in lon. 65° W. Much of the E. portion is occupied by Hudson bay, with its S. projection, James bay. The length E. and W.

is about 2,500 m.; breadth of the mainland N. and S., 1,500 m.; estimated area, including the islands in the Arctic ocean, about 2,750,000 sq. m. The southwestern portion is generally level or rolling; further E. the surface is extremely uneven, with mountains in places 1,000 ft. high, and is interspersed with extensive marshes. For 600 m. W. of Hudson bay there is generally a rise of 2 ft. to the mile. N. of about lat. 56° there is a descent for a distance of upward of 1,200 m. to the Arctic ocean. The numerous great lakes which succeed each other in a N. N. W. and S. S. E. direction are a prominent feature of the country. The largest of these, commencing at the south, are Winnipeg (with Manitoba and Winnipegosis), Deer, Wollaston, Athabasca, Great Slave, and Great Bear. There are two great river systems, the one discharging its waters directly into the Arctic ocean and the other into Hudson bay. The great arctic river is the Mackenzie, which with its upper portion, the Slave and Athabasca, and its tributaries, Peace and Mountain rivers, drains the W. portion of the Northwest territories, and discharges the waters of Athabasca, Great Slave, and Great Bear lakes. E. of the Mackenzie the Arctic ocean receives Coppermine river and Back or Great Fish river. The chief tributaries of Hudson bay, besides several from the east, are the Abbitibbe from the south, and the Albany, Severn, Nelson, and English or Churchill from the west. Nelson river is the outlet of Lake Winnipeg, and the Churchill discharges the waters of Deer lake and a part of those of Wollaston lake, the rest flowing into Athabasca lake. Lake Winnipeg receives at its S. E. extremity Winnipeg river, which discharges the waters of the lake of the Woods, and through Rainy river those of Rainy lake on the United States border. From the west Lake Winnipeg receives through Dauphin river the waters of Manitoba and Winnipegosis lakes, and at the N. W. extremity the Saskatchewan river, which, rising by several branches in the Rocky mountains, drains the S. W. portion of the Northwest territories. The Assiniboin river rises W. of Lake Winnipegosis, and flowing S. E. and E. joins the Red river in Manitoba.—The geology of this region is not accurately known. A belt of azoic rocks, 150 or 200 m. wide, and apparently of the Huronian and Laurentian formations, stretches N. W. from the shore of Lake Superior to the Arctic ocean, between the mouth of the Coppermine river and lon. 95° . This belt is bordered on the west for the most part by a margin of Silurian and Devonian rocks. The extensive region W. of this consists of different formations, the cretaceous being extensively developed in the south. There are extensive beds of lignite on the Mackenzie river. The Athabasca flows through beds of limestone, broken occasionally by cliffs of clay slate, while in the vicinity are found sulphur, iron, bitumen, and plumbago. The Peace

river region has plaster quarries and carboniferous deposits, and there are deposits of coal on the upper Saskatchewan. N. of the lower Saskatchewan there is an extensive belt of primary rocks, with limestone strata of Silurian formation in the vicinity. In the Devonian formation on the W. shore of Lakes Manitoba and Winnipegosis there are numerous salt springs. The region E. of Hudson bay is composed chiefly of the Laurentian formation. From James bay around the W. side of Hudson bay there is a broad margin of Silurian and Devonian rocks, extending to the Arctic ocean. About 30 m. from the sea copper has been found on the Coppermine river, but not in large quantities. Before the use of iron was known to them, the northern or Coppermine Indians used the copper for hatchets, ice chisels, and arrow heads.—The climate of the Northwest territories is severe, and in the greater portion of the country agriculture is not practicable. In the north permanent frost is found a few feet below the surface, the ground thawing to a slight depth only in the brief summer. The western portion has a higher temperature than the eastern, the isothermal line tending N. as we proceed W. from Hudson bay. In the S. part, W. of the 100th meridian, there is a considerable tract that suffers from lack of moisture. The entire region N. E. of the chain of lakes and the Mackenzie river, with small exceptions, is a barren waste, valuable only for its furs. The climate is inhospitable, pasturage is wanting, and the surface is clothed only with a scanty growth of stunted trees. The region W. of this may be subdivided into the desert, the prairie, and the forest. The desert, the N. extremity of what was formerly called the great American desert, occupies the S. W. portion, bounded N. E. by a somewhat irregular line commencing at the 100th meridian and 49th parallel, and extending N. W., crossing the 52d parallel at the 113th meridian, and reaching as far N. as the 55th parallel. This section embraces about 50,000 sq. m. It is too arid for agriculture, its principal production being prairie hay (*synteria dactyloides*), which preserves its flavor and nutritive properties through the winter, and is eagerly sought for by the bison (buffalo) and by domestic animals. N. and N. E. of the desert is the prairie section, comprising about 50,000 sq. m., covered in summer with rich verdure, which affords excellent pasturage, and diversified with occasional clumps of poplars, aspens, and birches. The soil is generally fertile, but the climate, often hot in summer, is very cold in winter, and late and early frosts are common. Storms of wind and hail are frequent in this region. N. of the prairie is the forest section, comprising about 480,000 sq. m., and containing within its limits occasional prairies, as in the valleys of Peace and Mountain rivers. It embraces tracts capable of cultivation, particularly along the principal streams and around the larger lakes, which

moderate the temperature. Fires are constantly devastating the wooded country and adding to the area of the prairies. The best agricultural regions are the valley of Peace river, the district along the upper waters of the Athabasca, and the valley of the Saskatchewan, except along its lower course. These tracts are capable of producing the root crops, wheat, barley, &c. The region in the vicinity of Rainy river, the lake of the Woods, and Winnipeg river, and the islands in Lake Winnipeg, are well wooded, the chief trees being red and white pine, cedar, oak, elm, and ash. W. of the 100th meridian the principal trees are the poplar, spruce, gray pine, balsam fir, and birch. The ash-leaved maple, which yields sugar, is found as far N. as the 55th parallel and as far W. as the 107th meridian. Various kinds of berries are common. The fauna of the country includes bears, badgers, raccoons, wolverenes, weasels, ermines or stoats, minks, martens, pekans or fishers, otters, skunks, Esquimaux and other dogs, wolves, foxes, lynxes, beavers, muskrats, lemmings, marmots, squirrels, porcupines, hares, moose, caribou or reindeer, the wapiti or stag, deer, antelope, musk ox, and bison. The polar bear is found only in the north, the grisly bear in the southwest; the brown bear frequents the barren region of the northeast as far up as the Arctic ocean, while the black bear is widely diffused. There are two species of the caribou, the one frequenting the barren region, the other the wooded country. The musk ox is found only in the barren wastes in the north. Vast herds of bisons formerly roamed over the plains W. of Red river, but they are rapidly disappearing before the hunters, and are now found chiefly on the N. branch of the Saskatchewan. The seal and walrus are found on the shores of the Arctic ocean. Various species of birds are common, the most useful of which are the grouse, ptarmigan, plover, lapwing, crane, and water fowl, such as ducks, geese, swans, gulls, and pelicans, which breed in the northern regions in summer. The principal rivers and larger lakes are well stocked with fish, including perch, carp, pike, whitefish, sturgeon, &c.—The white inhabitants, scattered at the various Hudson Bay company's posts and employed by the company, number about 2,500. The greater portion are Scotch (chiefly from the Orkney islands), with some French Canadians and other nationalities. The half-breeds, for the most part similarly employed, number about 5,000. Archbishop Taché estimates the Indian population (excluding Labrador) at 60,000, viz.: Algonquins, 30,000; Assiniboin, 4,000; Blackfeet, 6,000; Chipewyans, 15,000; Esquimaux, 5,000. The Algonquins occupy chiefly the region E. of the Rocky mountains and S. of Churchill river, and in a large part of it are found to the exclusion of other races. This family consists of three tribes: the Saulteaux or Chippeways, who occupy a belt 3° or 4° wide N. of the 49th parallel, extending as

far W. as the 105th meridian; the Maskegons or Swampies, N. of these as far as Hudson bay; and the Crees, situated between the other two and extending to the Rocky mountains. The Crees are subdivided into two sections, the plain Crees and the forest Crees. The Assiniboin or Stonies are a branch of the Sioux family, and occupy a narrow strip of country stretching from the upper part of the Athabasca river S. E. to the Mouse, a S. affluent of the Assiniboin. They are subdivided into the Assiniboin of the plains and the Assiniboin of the forest. The Blackfeet roam over the W. portion of the plains S. of the Saskatchewan, and are subdivided into three tribes: the Sixika or Blackfeet proper, the Pieganew or Piegiens, and the Bloods or Kena. With these are connected the Sarcis, who speak a different language. The Chipewyans, divided into several groups, inhabit the valley of the lower Athabasca, the Slave, and the upper Mackenzie rivers, as well as the region watered by the Churchill, except in its lower course. (See TINNE.) The Esquimaux occupy the extreme north, along the shore of the Arctic ocean and the coast of Hudson bay as far S. as the 60th parallel. These Indians, except those inhabiting the plains of the southwest, are peaceable. They subsist by hunting, trapping, and fishing. The furs, which are the sole export of the country, are purchased by the Hudson Bay company. (See FUR.) There are numerous Roman Catholic, a number of Anglican, and a few Methodist and Presbyterian missions among the Indians, and many of them have embraced the Christian religion.—The government of the Northwest territories, by an act of 1875, is vested in a lieutenant governor and a council of not more than five members, appointed by the governor general in council. As soon as any district of not more than 1,000 sq. m. contains 1,000 adult inhabitants, it may elect a member of the council for two years, and a second member when such inhabitants number 2,000. When there are 21 elected members, they will constitute a legislative assembly, and the appointed council will cease.—In 1670 Charles II. granted to Prince Rupert and 14 others and their successors, under the title of "the governor and company of adventurers of England trading into Hudson's bay" (commonly called the Hudson Bay company), "the sole trade and commerce of all those seas, straits, bays, rivers, lakes, creeks, and sounds, in whatsoever latitude they shall be, that lie within the entrance of the straits commonly called Hudson's straits, together with all the lands and territories upon the countries, coasts, and confines of the sea, bays, lakes, rivers, creeks, and sounds aforesaid," not previously granted. This region was held by the company to embrace all the territory watered by streams flowing into Hudson or James bay, and was denominated in the charter "Rupert's Land." The company was by the charter invested with the ownership of the

soil and with governmental powers within the region. The country W. of this, watered by streams flowing into the Arctic and Pacific oceans, was distinguished as the Indian or Northwest territory. In 1783 the Northwest company was chartered, with headquarters at Montreal, for the purpose of carrying on the fur trade. The two companies had frequent collisions till 1821, when the Northwest company was merged in the Hudson bay company. In that year the British government granted the latter company a license of exclusive trade in the Indian territory for a period of 21 years, and in 1838 a new license for 21 years. After its expiration in 1859 the company continued to carry on the fur trade in the Indian territory, though possessing no special privilege there. In 1858 the colony of British Columbia was formed from the W. portion of the Indian territory, and in 1859 Vancouver island, in which in 1849 a license of exclusive trade and management for 10 years had been granted to the company, was erected into a colony; while in 1870 the province of Manitoba was created in the Red river valley, reducing the region formerly under the control of the Hudson Bay company (and commonly called the Hudson Bay territory) as proprietor or grantee of a trading monopoly to the limits described at the beginning of this article. Before the last mentioned date, however, the company had become a mere commercial organization. The parliamentary act of 1867 creating the Dominion of Canada contemplated the acquisition by that government of the Hudson Bay territory, and negotiations were opened which resulted in the surrender by the company to the crown of all its territorial and governmental rights, by deed dated Nov. 19, 1869. It retained its posts with a small lot of land around each of them, and reserved the right to certain portions of land in the fertile belt S. of the N. branch of the Saskatchewan. The Canadian government agreed to pay in return the sum of £300,000. The country became a part of the Dominion on July 15, 1870, in accordance with a royal proclamation of June 23. An act of the Dominion parliament of June 22, 1869, had provided for its government, when annexed, under the name of the Northwest territories.—The Hudson Bay company in its trading capacity extends its operations beyond the regions already described, into portions of the provinces of Ontario and Quebec and that part of Labrador under the jurisdiction of Newfoundland. At one time it had posts on United States territory, in Oregon, Washington territory, and Alaska. Its fur trade has been of vast extent, and its profits at times enormous. In its dealings with the Indians it has had remarkable success. The field of operations is divided into four departments: the Montreal department, which includes the establishments in Quebec, in the Newfoundland portion of Labrador, and in the adjacent portions of the Northwest territories; the southern

department, including the establishments in the remainder of the Northwest territories E. of the 90th meridian and those in Ontario; the northern department, embracing the portion of the Northwest territories W. of the 90th meridian; and the western department, W. of the Rocky mountains. These were placed in charge of a governor (formerly the governor of Rupert's Land), under whom were different grades of officers and employees, known as chief factors, chief traders, clerks, apprenticed clerks, postmasters, interpreters, and numerous guides, boatmen, &c. The governor was assisted by a council of chief factors and traders for each department, which met annually. Under a recent reorganization the principal officer is denominated chief commissioner, under whom are inspecting chief factors, factors, chief traders, junior chief traders, &c. The departments are subdivided into districts, each under the superintendence of a factor or trader, and the districts include various posts or forts in charge of officers of different grades. The officers and employees are remunerated as formerly, in part by fixed salaries and in part by a percentage of profits. In 1856 the whole number of employees was about 3,000, including the governor, 16 chief factors, 29 chief traders, 5 surgeons, 87 clerks, 67 postmasters, 1,200 permanent servants, and 500 voyageurs, with temporary employees, chiefly voyageurs and servants. At that date there was a fifth department, Oregon, and the whole number of districts was 33, and of posts 152. At the time of the surrender to the crown there were 20 districts within the present limits of the Northwest territories and Manitoba, viz.: Albany, Athabasca, Cumberland, East Main, English River, Kinogumisse, Labrador, Mackenzie River, Manitoba Lake, Moose, Norway House, Portage la Prairie, Rainy Lake (Lac la Pluie), Red River, Rupert's River, Saskatchewan, Superior, Swan River, Temiscamingue, and York; these contained 120 posts. The northernmost post is the "Ramparts," on the Porcupine river and the Alaska border, about lat. 67°. The two most important posts are York Factory, on Hudson bay near the mouth of Nelson river, and Fort Garry in Manitoba. The latter is the company's headquarters in America; the former until a recent period was the sole point of import and shipment, and is still visited by one or two vessels annually; but the greater part of the trade is now carried on through the United States, by way of Manitoba. Communication between the different posts and transportation of goods are effected in winter by means of dog sledges, and in summer by means of canoes and boats on the streams, frequent portages around rapids and between different water-courses being in many cases necessary.—See "Notes of a Twenty-five Years' Service in the Hudson's Bay Territory," by S. McLean (2 vols., London, 1849); "The Hudson's Bay Territories," &c., by R. M. Martin (London, 1849); "Exploration of the Country between

Lake Superior and the Red River Settlement," by J. S. Dawson (Toronto, 1859); "Narrative of the Canadian Red River Exploration Expedition of 1857," &c., by H. Y. Hind (2 vols., London, 1860); *Esquisse sur le Nord-Ouest*, by Archbishop Taché (Montreal, 1869; translated by Capt. D. E. Cameron, "Sketch of the Northwest of America," Montreal, 1870); "Peace River: a Canoe Voyage from Hudson's Bay to the Pacific in 1828," edited by Malcolm McLeod (Ottawa, 1872); "The Great Lone Land," &c., by Capt. W. F. Butler (London, 1872); and "The Wild North Land," &c., by the same (1873).

NORTON, a N. W. county of Kansas, bordering on Nebraska, and intersected by the N. fork of Solomon river and affluents of the Republican river; area, 900 sq. m. It is not included in the census of 1870. The surface consists chiefly of rolling prairies.

NORTON, **I. Andrews**, an American author, born in Hingham, Mass., Dec. 31, 1786, died in Newport, R. I., Sept. 18, 1853. He graduated at Harvard college in 1804, became a tutor in Bowdoin college in 1809, and a tutor in mathematics in Harvard college in 1811. In 1818 he was appointed librarian of the college, and in the same year succeeded the Rev. Dr. Channing as lecturer on Biblical criticism and interpretation, in the chair endowed by Samuel Dexter. In 1819, on the organization of the divinity school as a separate department of the university, he was chosen Dexter professor of sacred literature. He resigned the office of librarian in 1821 and his professorship in 1830, and passed the remainder of his life for the most part in retirement, in feeble health. In 1833 he published "A Statement of Reasons for not believing the Doctrines of Trinitarians concerning the Nature of God and the Person of Christ" (new ed., 1856, with a memoir by Dr. Newell of Cambridge). In 1837 appeared the first volume of his elaborate work on "The Genuineness of the Gospels," which was followed in 1844 by vols. ii. and iii., devoted principally to the history of Gnosticism. A fourth volume, on the internal evidences of the genuineness of the Gospels, appeared after his death, and an abridged edition in 1867. He left a "Translation of the Gospels," which was published in 1855, with a supplementary volume of notes, edited by his son. Of his other literary labors, those which attracted the most attention were his inaugural discourse on assuming the duties of his professorship, and his address to the alumni of the divinity school in 1839, "On the Latest Form of Infidelity." He also edited, in 1833-'4, in connection with Mr. Charles Folsom, the "Select Journal of Foreign Periodical Literature." **II. Charles Eliot**, an American author, son of the preceding, born in Cambridge, Mass., Nov. 16, 1827. He graduated at Harvard college in 1846, and soon entered a counting house in Boston to become familiar with the East Indian trade. In 1849 he went to sea as supercargo of a ship

bound for India, in which country he travelled extensively, returning home through Europe in 1851. He made a second visit to Europe in 1855-'7, and went there a third time in 1868, remaining till 1873. In 1855 he edited with Dr. Ezra Abbot his father's translation of the Gospels with notes (2 vols.), and his "Internal Evidences of the Genuineness of the Gospels" (1 vol.). During the civil war he edited at Boston the papers issued by the "Loyal Publication Society," and from 1864 to 1868 inclusive he was joint editor with James Russell Lowell of the "North American Review." His publications in book form are: "Considerations on some recent Social Theories" (1853); "Notes of Travel and Study in Italy" (1860); and a translation of the *Vita nuova* of Dante (1867).

NORTON, **Caroline Elizabeth Sarah**, an English authoress, born in 1808, died June 15, 1877. She was a granddaughter of Richard Brinsley Sheridan, and sister of Lady Dufferin and the duchess of Somerset. Her first publication was "The Dandies' Rout," illustrated by herself. In 1827 she was married to the Hon. George Chapple Norton, a brother of Lord Grantley. In 1836 she was tried for criminal intimacy with Lord Melbourne, but acquitted. She afterward lived separately from her husband, who died in 1867; and on March 1, 1876, she married Sir William Stirling Maxwell. Her first volume of poems, comprising among others "The Sorrows of Rosalie," written in her 17th year, was published anonymously in 1829. "The Undying One," founded on the legend of the Wandering Jew, appeared in 1830. Her succeeding works are: "The Wife, and Woman's Reward" (1835); "A Voice from the Factories" (1836); "The Dream, and other Poems" (1840); "The Child of the Islands" (1845); "Stuart of Dunleath, a Survey of Modern Times" (1847); "Tales and Sketches in Prose and Verse" (1850); "English Laws for English Women in the 19th Century" (privately printed, 1854); "A Letter to the Queen on Lord Chancellor Cranworth's Marriage and Divorce Bill" (1855); "The Lady of La Garaye" (1861); "Lost and Saved" (1863); and "Old Sir Douglas" (1868).

NORTON, **John**, an American clergyman, born at Stortford, Hertfordshire, England, May 6, 1606, died in Boston, Mass., April 5, 1663. Educated at Cambridge, he was curate in Stortford, embraced Puritanism, came to Plymouth, New England, in October, 1635, and preached there during the winter. In 1636 he became minister of the church at Ipswich. With Gov. Bradstreet he was an agent sent from the colony in 1662 to address Charles II. after his restoration. He wrote a treatise against the Quakers, entitled "The Heart of New England rent by the Blasphemies of the Present Generation," which so exasperated the members of that sect, that after his death they represented to the king and parliament that "John Norton, chief priest in Boston, by the immediate power of the Lord, was smitten and died."

NORWALK, a town and borough of Fairfield co., Connecticut, on Long Island sound, at the terminus of the Danbury and Norwalk railroad, and on the New York, New Haven, and Hartford railroad, 60 m. S. W. of Hartford and 43 m. by rail N. E. of New York; pop. of the town in 1860, 7,582; in 1870, 12,119, including about 6,000 in the borough. The town contains five post offices, Norwalk, Rowayton, South Norwalk, West Norwalk, and Winnipauk, and besides the borough includes the city of South Norwalk (pop. 3,000), incorporated in 1870. There are four railroad stations. The Norwalk river empties into the sound at this point, and a horse railroad connects Norwalk bridge and South Norwalk. Vessels drawing six feet of water can reach the up-town wharves at low tide, and freight and passenger steamers make daily trips to New York. Norwalk is especially noted for its trade in oysters. The natural scenery is fine, combining land and water views of much beauty. There are many elegant residences. The town is divided into 11 school districts, and has good public schools, several excellent private schools, and three weekly newspapers. It contains two large felt cloth factories, a fancy cassimere factory, two straw hat factories, a number of large felt hat factories, a shirt factory, iron works, a lock factory, a paper box factory, a manufactory of wrapping paper, a pottery, boot and shoe factories, &c. The borough has an efficient fire department, and fine water works, which also supply Winnipauk, a manufacturing village, which together with the borough and city is supplied with gas. The borough contains two national banks, two savings banks, and a fire insurance company; the city, one national bank, one savings bank, and a fire insurance company. There are 16 churches, of which 6 are in the borough, 4 in the city, and 6 in other parts of the town.—Norwalk was settled about 1640. It was burned by the British, under Gov. Tryon, in July, 1779. It was the scene of a terrible railroad accident in 1853, when an express train plunged into the open draw, and 50 lives were lost. The borough was incorporated in 1836.

NORWALK, a town and the capital of Huron co., Ohio, on the Lake Shore and Michigan Southern railroad, 95 m. N. by E. of Columbus, and 56 m. by rail W. of Cleveland; pop. in 1870, 4,498. It extends along a sandy ridge, and is built principally on a single street shaded by a double row of maples. The buildings are tastefully constructed. The town is lighted with gas, and has Holly water works. It contains several founderies and machine shops, flouring and saw mills, two national banks, graded public schools, two weekly newspapers, and 12 churches.

NORWAY (Norw. and Dan. *Norge*; Swed. *Norrige*), a kingdom of northern Europe, occupying the western portion of the Scandinavian peninsula, and lying between lat. 57° 57' and 71° 11' N., and lon. 4° 45' and 31° 15' E.

It is bounded N. by the Arctic ocean, E. by Russian Lapland and Sweden, S. by the Skagger Rack, and W. by the North sea and the Atlantic ocean. Its length is about 1,080 m., its greatest breadth 275 m., and its area 122,279 sq. m. It is divided for political purposes into six stifts or dioceses, named from their chief towns, the area and population of which, according to the government returns of Dec. 1, 1865, are as follows:

STIFTS.	Area in sq. miles.	Population.
Christiania or Aggerhuus.....	10,053	448,874
Hamar.....	19,706	245,422
Christiansand.....	15,406	323,742
Bergen.....	14,369	267,854
Drønheim.....	19,553	256,529
Tromsø.....	42,687	155,335
Total.....	122,279	1,701,756

These are subdivided into 20 amts or districts. According to an official calculation, founded on the movement of population, the total population in January, 1873, was estimated at 1,763,000. A new census is to be taken in December, 1875.—The coast line trends generally N. E. and S. W. from the North cape, its northernmost point, to Cape Stadt, whence it runs S. to about lat. 59°, where it turns gradually S. E.; and beyond Lindesnæs (the Naze), its southernmost point, it assumes again a north-easterly course, which it keeps to its junction with Sweden. It is very rugged, being indented by numerous arms of the sea, some of which extend far inland and form many branches. In these bays or fiords is some of the most magnificent scenery in the world, their shores often rising in precipitous cliffs to a height of from 3,000 to 4,000 ft. Many of them are deep and form excellent harbors, but navigation is rendered dangerous by numerous islands, which obstruct their entrances and line the whole coast. The principal fiords are the Varanger, Tana, Laxe, Porsanger, Alten, Kvenang, Lyngen, and Senjen, on the Arctic coast; the West, Folden, Salten, Drønheim, and Molde, on the Atlantic; the Stav, Sogne, Hardanger, Bømmel, and Bukke, on the North sea; and the Christiania, on the coast of the Skager Rack. The islands on the coast number many hundreds, and have an aggregate area of about 8,500 sq. m. The whole number of inhabited isles is 1,160, with an aggregate population of 212,000. Of these, 80 lie off the coast of the Arctic ocean, between the Russian frontier and the Loffoden isles, and have 20,000 inhabitants; the Loffoden and Vesterdaalen groups comprise 40, with 30,000 inhabitants, off the Atlantic coast, from the Loffoden isles to Cape Stadt, are 510, with 66,000 inhabitants; off the coast of the North sea, between Capes Stadt and Lindesnæs, are 350, with 72,000 inhabitants; and in the Skager Rack, from the latter cape to the Swedish frontier, are 180, with 23,500 inhabitants. The

islands off the coast of the Arctic ocean are very rocky and mountainous, with peaks from 3,000 to 4,000 ft. high, generally covered with snow and ice. Among them many isolated rocks like cones rise out of the sea, inhabited by millions of aquatic birds. On Magerö is the North cape, the most northerly point of the continent of Europe, with cliffs 300 ft. high. On Kvalö is Hammerfest, the most northerly city in the world; and on Tromsö is the city of the same name, with 4,000 inhabitants. Senjen is the second largest island in Norway. The Loffoden isles are also very rocky and mountainous; the principal one, Hindö, is the largest in Norway. At the S. W. end of the Loffoden islands is the Maelstrom, which is produced by the currents of the West fiord. (See MAELSTROM.) In 1869 there were 90 lighthouses on the coasts of Norway, of which 4 were on the Arctic coast, 30 on the Atlantic, 34 on the North sea, and 22 on the Skager Rack. That of Fruholmen, near Hammerfest, in lat. $71^{\circ} 5' 45''$, is the most northerly one in the world. The principal ports are Christiania and Christiansand on the Skager Rack, and Bergen, Christiansund, and Drontheim on the North sea.—The surface is very mountainous, particularly in the north, but there are no well defined and regular ridges, the great Scandinavian chain, which extends, under the names of Kiölen, Dovrefield, and Langfield, and other appellations, N. and S. throughout the peninsula, consisting rather of a series of elevated plateaus called *fjelds* or fields, from which rise mountain masses. The principal summits are Ymes Field, 8,540 ft. above the sea, and Skagtöls Tind, 8,061. The descent from these plateaus on the Swedish side is gradual, but on the west it is abrupt and precipitous, though it stretches out far toward the sea, and in some places covers almost the entire width of the kingdom. The whole country is extremely rugged. Minor lateral ranges branch from the main chain, forming deep narrow valleys, each with its stream and lakes. On the W. coast the lower parts of these valleys form the fiords, the upper parts of which are but dark narrow lanes of water, with wooded precipices rising from their edges, and cataracts and torrents pouring into them. Among the most famous natural curiosities is the mountain of the Kilhorn in Nordland, a remarkable pyramidal peak, terminating with a long, sharp, spire-like summit, and having a large perforation about three fourths of the way up its side. The mountain of Hornelen, which forms the E. extremity of the island of Bremanger at the entrance of Vaags fiord, is an isolated mass from which rises a sharp-pointed peak inclined at an angle of 60° to the horizon, and appearing about to topple over upon the surrounding plain. Some of the mountain passes are extremely picturesque. The Vöring-fos and Rinkan-fos are cataracts, each 900 ft. in perpendicular descent, and several of the rivers have falls of less height. The principal rivers are the Tana and Alten, which

flow into the Arctic ocean, the former forming part of the boundary of Russian Lapland; the Namsen, which empties into the Atlantic; and the Laugen, Drammen, and Glommen, which fall into the Skager Rack. There are many other smaller streams. Lakes abound in all parts of the country, the largest being the Miösen, 40 m. N. of Christiania, 55 m. long and from 1 to 12 m. broad; it is formed by an expansion of the river Laugen, and discharges into the Glommen through the Vormen. The geological formation is chiefly primitive and transition rocks. The most abundant is gneiss, alternating occasionally with granite, and intermixed with mica slate. Limestone, quartz, and hornblende are also found. In the southern districts there are many traces of volcanic action. The mountains are rich in iron, copper, silver, nickel, and cobalt; but the mines are not worked to their full capacity on account of government restrictions and the scarcity of fuel. The silver mines of Kongsberg belong to the state. The Röraas copper mines have been worked for more than 200 years. The iron mines are but imperfectly worked, but the metal is of superior quality.—The soil is in general poor. Only 0.8 per cent. of the surface is under cultivation; 2.1 per cent. is meadow, and 97.1 woodland, pasture land, or barren. The land is of a light sandy texture, which under the best cultivation could not yield heavy crops; but there are vast pasture lands of good quality. The climate is healthy, and less severe than might be expected from the high latitude and elevation of surface, being considerably tempered by the sea and warm S. W. winds. Many of the western and northern gulfs and fiords are rarely or never frozen, while those on the south are filled with ice. The mean temperature at Christiania is 43° F.; at Ullensvang, on the gulf of Hardanger, 44° ; at Drontheim, 39.50° ; at the Salten fiord, 43° ; and at the North cape, 29° . The temperature is milder than that of any other region equally distant from the equator. Vegetation flourishes as far N. as lat. 70° . The weather is remarkably steady for the latitude. About $\frac{3}{8}$ of the surface is covered with perpetual snow; in other districts snow lies only about four months in the year, beginning toward the end of November. In January and February the mercury ranges from 14° F. above to 15° below zero, and sometimes sinks to 31° below. In summer it rises occasionally to 108° , and the crops ripen three months after sowing. The principal crop is barley, which is cultivated as far N. as lat. 70° . Rye, oats, wheat (in favorable seasons and southern districts), potatoes, flax, hemp, a little tobacco, and apples, pears, cherries, and other fruits are also raised. The system of agriculture is extremely rude, and the prejudice of the farmers against innovation precludes the hope of any speedy improvement. Under-drainage is never practised. A large quantity of grain, chiefly rye and barley, is annually imported from Denmark

and Russia. The precariousness of the crops has led to the establishment of corn magazines where farmers may deposit their surplus produce, receiving interest for it at the rate of 12½ per cent. per annum, and in time of scarcity may borrow grain at the interest of 25 per cent. per annum. Most of the land is the property of the cultivators. The number of landed estates in 1869 was 147,453, of which 131,780 were cultivated by owners. The owners till the soil themselves, with the aid of their tenants. The latter in 1865 numbered 60,330. The tenant hires from the owner land enough to keep one or two cows and a few sheep, for which he pays rent in days' work in each season. Much of the agricultural work is done by women. There are large tracts covered with valuable timber. Fir, mountain ash, birch, poplar, and willow grow in all the provinces; oak only in the southern. The pine and fir forests, which are chiefly on the banks of the rivers flowing into Christiania fiord, give employment to great numbers of timber merchants; and their product, besides being converted into planks and beams, is invaluable for fuel in working the mines, no coal being found in the kingdom. Nearly all the exported timber is sent to France.—The principal wild animals are the wolf and the bear. Deer are now scarce. The lynx and wolverene are occasionally met with, and there are hares, wild fowl, and other game in abundance. One of the most valuable domestic animals is the reindeer, which constitutes the main dependence of the inhabitants of the northern provinces. Cattle are reared in great numbers, but the breed is inferior; and the horses, though strong and surefooted, are of small size. Ponies of a good breed are raised and exported. Sheep and goats are numerous. In 1866 the number of horses in the kingdom was 149,167; horned cattle, 953,036; sheep, 1,705,394; goats, 290,985; swine, 96,166; and tame reindeer, 101,768. The rivers and lakes are abundantly stocked with many varieties of excellent fish, among which are trout and salmon, while the neighboring seas afford valuable fisheries of cod and herring.—Among the inhabitants born in Norway, besides Norwegians proper, there were in 1866 7,637 Finns, 15,601 settled Laplanders, 1,577 Laplander nomads, called in Norway *Finner*, and about 4,000 of mixed races. The number of foreign inhabitants was 21,260, of whom 15,784 were Swedes, 1,791 Danes, 1,684 Finns, 1,257 Germans, and 348 English. The Laplanders live in the northern provinces, almost isolated from the rest of the inhabitants; their chief occupation is tending their reindeer herds. In the southern provinces industry is devoted more to stock raising than to tillage. The Norwegians are among the best sailors in the world, large numbers being engaged from early life in the coast fisheries and local navigation, which is intricate and dangerous. The people generally are frugal, industrious, upright, and enterprising.

They are somewhat reserved in manner, but kind and hospitable, simple in habits, firm in purpose, and exceedingly patriotic. The condition of the working classes is poor, and in some parts of the country they are said to live in the same manner that they did three centuries ago. The use of strong drink prevails extensively, and few laboring men save any money. Companies have been formed to build better dwellings for the working poor, who have shown an inclination of late years to emigrate in large numbers to the United States. From 1856 to 1865 this emigration amounted to 54,000; from 1866 to 1870, to 76,400; in 1871, 12,300; and in 1872, 14,400. The Lutheran is the established church, and although all creeds are permitted to be publicly professed, no one can be legally married until confirmed in the Lutheran church, and only members of that communion are admitted to public offices. Of the population in 1866, 1,696,651 were Lutherans, 3,662 belonged to other Protestant sects, 1,038 were Mormons, 316 Roman Catholics, 15 Greek Catholics, and 25 Jews. The established church is governed by six bishops, the eldest of whom is primate. The right of presentation to sees and livings belongs to the king, the minister for ecclesiastical affairs, and the Norwegian council of state. The clergy are generally well educated, and their incomes average about \$1,000 per annum, which, taking into account the value of money in Norway, may be considered high. There is no privilege of birth, hereditary nobility having been abolished by a law which passed the *storting* Aug. 1, 1821; but, as in Sweden, the sons of the technically noble and the wealthy always have the preference for places of honor. Scholastic or university education is also essential to obtaining position in church or state. The press is practically free, and almost every important town has at least one newspaper; in 1870 there were 80 published in the kingdom. There are several scientific periodicals. Education is compulsory, all children from 7 to 14 years of age being obliged to receive public instruction. Each parish has its schoolmaster, who is paid by a small tax levied on householders. Instruction in the primary schools, of which there are 6,500, is limited to reading, writing, arithmetic, geography, grammar, and religion. In 16 of the principal towns there are as many public classical schools, where are taught theology, Latin, Greek, Norwegian, German, French, English, mathematics, history, and geography. There is a university at Christiania, with faculties of theology, law, medicine, philosophy, and the sciences, which is attended by about 700 students. There are also a royal school of design, a military high school in the capital, and an agricultural school in Aas. The "Society of Public Good" maintains public libraries in different parts of the kingdom, and there are many learned and scientific societies.—Although Norway is essentially an agricultural and pastoral country, it

has, in proportion to its population, the largest commercial navy in the world. At the end of 1873 it consisted of 7,447 vessels, of 1,243,433 tons, manned by 56,147 men. Of these, 199 were steamers having 8,835 horse power, and a tonnage of 38,830. The total value of exports in 1873 was \$29,189,000; of imports, \$26,738,000. Of the exports, about 30 per cent. were to Great Britain, 16 to Germany, and 8 to France; of the imports, about 28 per cent. were from Great Britain, 26 from Germany, 15 from Denmark, 9 from Sweden, and 9 from Russia. The principal exports are timber and wood, bark, fish, ice, calf and sheep skins, and copper and iron ore; the principal imports are cotton and woollen goods, groceries, grain, tobacco, and manufactured iron. The internal trade of the kingdom suffers from the want of good roads and the comparative thinness of the population. The highways however are gradually improving, and railways are in progress to connect the principal towns. The railways and telegraphs are the property of the government. In 1873 there were 312 m. of railway in operation, and 741 in construction and projected. Those open for traffic were: Christiania to Eidsvold, 45 m.; Christiania to Stockholm, 350 m., of which 76 are in Norway; Christiania to Drammen and Kongsberg, 50 m.; Drammen to Randsfjord, 42 m.; Vigersund to Kroderen, 21 m.; Drontheim to Støren, 28 m.; and Drontheim to Meraaker, 50 m. At the end of 1873 there were 101 telegraph stations in the kingdom, with 3,876 m. of lines; the total number of despatches sent was 780,285. The number of post offices in 1872 was 719; number of letters during the year, 7,479,350. Accounts are kept in specie dollars, called *Species*, equal to \$1 10, and divided into 120 *Skilling*. These coins are silver and copper, there being no gold currency. There is a national bank, which issues notes, in Drontheim, with branches in Christiania, Bergen, and Christiansand.—The fisheries constitute one of the principal industries, and employ many thousand men. The herring fishery, the chief seat of which is on the W. coast between Capes Lindesnæs and Stadt, is carried on in both winter and autumn. The winter fishery, beginning in January, is called the great fishery, and employs about 50,000 men for two months, with a usual product of 800,000 barrels. The autumn fishery is less productive. The cod fisheries may be divided into the sea and the fiord fisheries. The principal sea fisheries are off the Loffoden isles and the coast of Finmark. The former, which is carried on chiefly in February and March, now employs about 20,000 men and 4,000 to 5,000 boats. The catch is about 20,000,000 fish. These are the largest cod that are caught. The Finmark fishery begins later, ending about the last of May. The yield is usually from 11,000,000 to 15,000,000 fish, which are smaller than the Loffoden cod, and resemble those caught off the coast of Labrador. The total catch of

the cod fisheries in 1873 was 27,000,000. Previous to 1859 the Loffoden fishing waters were divided into small areas which were under the control of traders, but they are now free. On the S. coast the mackerel fishery employs many men. In 1869 there were 117 vessels and boats engaged in the shark fishery in the Arctic ocean, which took 7,277 barrels of livers for oil; and in 1870 there were 37 vessels employed in seal and walrus fishing off Nova Zembla and Spitzbergen. The usual product of the seal fishery is about 400,000 species a year. The other principal industries are lumbering, mining, and the common trades. The manufactures are of little importance, and consist chiefly in the production of cottons, woollens, linens, and silks for home use. There are also a few paper mills, distilleries, tobacco factories, and large salt works. The peasants supply nearly all their wants by their own labor.—Norway is united with Sweden under one sovereign, but according to the terms of its constitution is “free, independent, indivisible, and inalienable.” The government is a hereditary constitutional monarchy. The constitution, which was adopted Nov. 4, 1814, vests the legislative power in the *Storthing*, or assembly of deputies, chosen by indirect election. The people choose deputies at the rate of one to 50 voters in towns and one to 100 in the rural districts, and these deputies elect either from among themselves or from other qualified voters of the district the storthing representatives. Every male citizen of 25 years of age, who possesses land property of the value of 150 specie dollars, or who has been tenant of such property for five years, who is or has been a public functionary, or is a burgess of any town, is entitled to vote. Representatives must be at least 30 years of age and 10 years resident in Norway. The storthing formerly met every three years, but since the modification of the constitution in 1869 it has assembled annually. When assembled, it divides into two chambers, an upper one, called the *Lagthing*, consisting of one fourth of the members, and a lower one, the *Odelsting*, of the remainder. Each house chooses its own officers. The king cannot dissolve the storthing until it has been three months in session; and, though he may veto any measure, his veto may be overruled by the action of three successive storthings. The storthing makes and repeals laws; establishes imposts, taxes, and tariffs; authorizes loans, regulates the finances, votes appropriations, naturalizes foreigners, and examines documents relating to all public business, treaties, salaries, and pensions. There can be no domiciliary visits except in criminal cases, and no *ex post facto* laws. The army is not to be ordered out of the kingdom without the consent of the storthing, and no Swedish or other foreign troops shall enter Norway except to repel invasion; but a Swedish corps not exceeding 3,000 men may pass six weeks of each year in Norway for the purpose of exercising

with the Norwegian army. Norway preserves her own official language, bank, accounts, currency, and flag. The king exercises the executive power through a council of state, consisting of two ministers of state and seven councillors. Two of the councillors and one minister reside near the king at Stockholm, and the remainder are at Christiania. With the consent of the council the king may declare war, make peace, and conclude and abrogate treaties. The king must pass some months of every year in Norway, and on his accession to the throne must be crowned as king of Norway at Drontheim. The judiciary comprises courts of reconciliation in every parish, the arbitrators being chosen by the householders every three years; law courts sitting once a quarter in each of the 64 *Sorenskriverier* into which the kingdom is divided; the *Stiftsamt* in the chief town of each stift, composed of three judges with assessors; and the *høieste Ret*, a court of last resort, in Christiania, which is composed of a president and eight assessors. Capital punishment is not inflicted. The judges are liable in damages for their decisions. The budget for 1873 showed a revenue of 6,453,000 specie dollars, and an expenditure of 6,310,000. The principal items of the annual revenue were: customs, 3,638,000 specie dollars; excise on domestic brandy, 603,000; excise on grain, 362,000; interest on active capital, 635,000; post office, 343,000; mines, 192,000; telegraph, 192,000; stamps, 135,000; tolls on bridges and roads, 169,000. The chief items of expenditure were: civil list, 127,000; storthing, 75,000; council of state and government, 206,000; religion and public instruction, 214,000; justice, 328,000; interior, 496,000; army, 1,123,000; navy (including posts and telegraph), 1,233,000; foreign affairs, 131,000; finances, 1,298,000; railway construction, 793,000; bridge and road construction, 179,000. The public debt at the end of 1873 amounted to 7,998,500 specie dollars; the active capital of the state at the end of 1872 was 10,476,300. The army consists of troops of the line, *Landværn*, civic guard, and *Landstorm*. In time of peace the line consists of 12,000 men, and cannot be increased without the consent of the storthing to more than 18,000. The *Landværn* is only for the defence of the country, and the civic guard for the defence of the different localities. The *Landstorm* is organized only in time of war. The line is filled by the conscription of young men 22 years old. The time of service is seven years in the cavalry, and in the infantry, artillery, and engineers ten years, of which five are passed in the line, two in the reserve, and three in the *Landværn*. At the end of his term of service, each subject is liable to duty in the civic guard and the *Landstorm* until 45 years old. The navy in 1873 consisted of 27 steamers, of 2,670 aggregate horse power and 151 guns, and two sailing vessels, of 24 guns. Four of the steamers are monitors of two guns each. There are

also 57 gunboats, propelled by oars, carrying 114 guns, and 35 smaller ones carrying 35 guns. —The history of Norway prior to the 7th century rests upon tradition. The descendants of Odin are represented to have been the first kings, the earliest whose name has been transmitted to us being Sæming. Nor, the scion of an ancient Finnish family, established himself upon the site of modern Drontheim early in the 4th century, and subjugated the neighboring territory. Authentic history begins with Harald Harfager or the Fair-Haired, who subdued the petty kings or jarls of Norway, and united the tribes as a nation (A. D. 863–933). In his conquest he is said to have been animated by the love of Gyda, daughter of the jarl of Hardaland, who vowed not to wed him until he had subjugated the whole country. His victories induced many of the defeated princes to emigrate, and hence began the more famous maritime and piratical adventures of the Northmen. (See NORTHMEN.) His son Haco the Good, who had been educated in England at the court of Athelstan, introduced Christianity; but the old religion was not completely eradicated until three centuries later. Olaf or Olaus I., who came to the throne in 995 after a successful revolt, destroyed the pagan temples, and laid the foundations of Drontheim. He was killed in battle with the Danes, and for fifteen years following Norway was a prey to Swedish and Danish marauders. In 1015 Olaf II. (St. Olaf) determined to complete the work of his predecessor, and persecuted the pagans, though with less cruelty than Olaf I. In 1028 Canute the Great of Denmark and England landed in Norway, drove Olaf out of the kingdom, and was elected king. Olaf subsequently returned with an army, and was defeated and slain at Stiklestad in 1030. Canute deputed his son Sweyn to govern Norway, but after the death of his father Sweyn was driven out by Magnus I., the son of St. Olaf. Harald III., surnamed Hardrada from his severe discipline (1047–1066), invaded England, and, after capturing York, was slain in battle by the English king Harold II. at Stamford Bridge, in Yorkshire, Sept. 25, 1066. His grandson Magnus III. (1093–1103) conquered the isle of Man, the Shetlands, Orkneys, and Hebrides, and invaded Ireland, where he was killed in battle. His son Sigurd I., the great hero of Scandinavian song, is famous for various exploits against the Moors in Portugal and at sea, and for a pilgrimage to Jerusalem, where he offered his arms to Baldwin, and with him reduced and plundered Sidon. His death (1130) was followed by 54 years of civil war, interrupted only temporarily by the efforts of the English cardinal Nicholas Breakspear, afterward Pope Adrian IV., who came to establish an archbishopric at Drontheim, and instituted many excellent reforms. Order was restored by Sverre in 1184. His illegitimate son Haco IV. was succeeded by Guttorm and Haco V. (called by some of the

chroniclers Haco IV.), who subjugated Iceland (1261), and died in the Orkneys after losing a battle at the mouth of the Clyde (1262). The national prosperity of Norway declined from this epoch. Wars with Denmark exhausted the people. A monopoly of trade in the hands of merchants of the Hanseatic league checked the national industry; and the plague known as the black death, which broke out in 1348, ravaged the kingdom for more than two years to an unparalleled extent, destroying two thirds of the population. The country fell into a decay from which it did not recover for centuries. Magnus Lagabæter (law reformer) reigned from 1263 to 1280, and was succeeded by his son Eric II. After the death of Haco VII. in 1319 two Swedish kings obtained the throne successively, Magnus VIII. of Norway and II. of Sweden, and Haco VIII. of Norway, reckoned by some as the sixth of the name. The kingdom lost its nationality. A province first of Sweden, and afterward of Denmark, the country even lost its proper language, which became thenceforth a corrupt mixture of those of its neighbors. Haco VIII. married the daughter of Waldemar of Denmark, and died in 1380. The crown descended to his infant son, Olaf III. of Denmark, from which period down to the year 1814 the two countries were united. Margaret of Denmark succeeded her son Olaf III., and, having reduced Sweden, framed the "union of Calmar" (1397), the object of which was to unite the three crowns. With this view it was stipulated that the subjects of each country should have equal rights under the common sovereign, and should be governed by their own laws. From this period, and in violation of the treaty, the Norwegians lost all their independence. The nobles, wholly supplanted by Danish immigrants, were amalgamated with the peasants, impoverished, exiled, or massacred. The union of Calmar was severed by Gustavus Vasa of Sweden in 1523; and during nearly two subsequent centuries Norway was scarcely more than a province of Denmark. In the reign of Christian I. the Shetland and Orkney islands were transferred to Scotland as part of the dowry (in mortgage of money) of Christian's daughter on her marriage with James III. of Scotland. They were never redeemed. Christian died in 1481. The reformation reached Norway first in 1536. Christian IV. (1588-1648) was more popular in Norway than any other Danish king. He visited the country more than 50 times; rebuilt Christiania (1624) and founded Christiansand (1641); and instituted a code of laws, many of which are still in force. After this reign Norway was treated as a conquered province rather than as a joint kingdom; and it was not until the beginning of the present century that a brighter day began to dawn. Frederick VI. founded the university of Christiania (1811), and became endeared to the Norwegians. Meanwhile the Swedish government had entered into the coa-

lition against Napoleon (April 8, 1812); and by convention with Russia the possession of Norway was guaranteed to Sweden. England also entered into this guarantee, and the newly elected crown prince of Sweden, Bernadotte, according to engagements, took command of an army in Germany. After the battle of Leipsic (Oct. 16-19, 1813), the crown prince led the Swedish contingent into Holstein, with a view to compel the Danish government to cede Norway. A singular system of spoliation prevailed. Napoleon had on a former occasion signed away to Russia the Swedish province of Finland, which did not belong to him; Russia now indemnified Sweden by a present of Norway, to which she had no title. After the fall of Lübeck and some bloody actions in Holstein, the Danes were forced to the peace of Kiel (Jan. 14, 1814); and Norway was acknowledged as a dominion of Charles XIII. of Sweden. The people of Norway heard of this treaty with great indignation. The Danish crown prince, Christian, went at once to Norway, convoked a national diet in May at Eidsvold, near Christiania, and accepted the crown of Norway in independent sovereignty, and with it a constitution hastily drawn up on the spot. In July the Swedish crown prince, at the head of an army, invaded Norway by way of Frederikshald. A British fleet appeared off the coast, and blockaded the ports. Resistance was obviously a waste of life and property, and after a few unimportant actions the country submitted. The Danish prince abdicated his new throne; and on Aug. 14 an armistice and a convention were signed at Moss, uniting Norway and Sweden. The Norwegians obtained far better terms than had been designed by the allies originally, and the storthing formally ratified the union, Oct. 20. The constitution of Eidsvold, with few alterations, was accepted by the king, Nov. 4. On the death of Charles XIII., Bernadotte ascended the throne (1818) as Charles XIV. John. He made many unavailing attempts to reduce the country to closer submission to royal authority, and, in his desire to modify the constitution, tried in vain to win over a majority of the Norwegian storthing. He endeavored twice to obtain, in place of the suspending veto, an absolute one. In 1815 the storthing passed a resolution to abolish titles of nobility, a measure which the king refused to approve. The next two storthings passed the same resolution, notwithstanding an appeal of the king in person, and a strong military demonstration on the Swedish frontier; and the royal veto was thus rendered constitutionally null. Some years later the storthing resolved that the people of Norway should be styled citizens of that kingdom. Rarely indeed has a political assembly shown more jealousy of executive privileges. King Oscar I., who succeeded his father, March 8, 1844, was more conciliatory in his policy, and obtained a greater degree of

confidence. He gave the Norwegians a separate national flag, which his father had refused. In 1847 he established a Norwegian order of merit, that of St. Olaf. The general feeling of anxiety concerning Russian encroachments brought about an alliance, in November, 1855, between Norway and Sweden, England, and France. By this treaty the two Scandinavian powers, in exchange for a promise never to cede or sell territory to Russia or to any power without the consent of England and France, received a guarantee of future territorial integrity under protection of the last named powers. In 1857 King Oscar, in consequence of bad health, transmitted the government to his son Charles Louis Eugene as regent, who on the death of his father, July 8, 1859, ascended the throne with the title of Charles XV. The 50th anniversary of the union with Sweden was celebrated Nov. 4, 1864. The measures devised by the official committee (1865-'7) for permanently regulating the relations between the united kingdoms were rejected in 1870 by both countries. The principal cause of discord is the great preponderance in Norway of the peasantry, whose feelings are democratic. One of their leaders has demanded the suppression of the university of Christiania, and in 1869 a law was passed which tended in some degree to the suppression of classical education, since the peasants associate it with aristocracy. Charles XV. died Sept. 18, 1872, and was succeeded by his brother, Oscar II., who was crowned at Drontheim.

NORWAY, Language and Literature of. The *Norræna mál*, or northern language, now represented, with slight inflectional and orthographical variations, by the Icelandic, was the common language of Denmark, Norway, and Sweden from an unknown period to the 11th century. (See ICELAND, LANGUAGE AND LITERATURE OF.) Norway retained the old tongue longer than either of the other kingdoms. The few mediæval Norwegian documents do not exhibit any important grammatical changes until about the time of the annexation of Norway to Denmark toward the close of the 14th century. But from this period a rapid transformation took place, and soon after the beginning of the 16th century the written language and the speech of the higher classes became identical with those of Denmark. Outside of the large towns and among the peasants, however, the Danish has never been the spoken tongue, but the old *Norræna* has been corrupted into a number of dialects, diverging more or less in their structure from their ancient original. From these dialects some philologists have attempted to construct a national tongue, and the efforts of several poets and story writers have made the movement partially successful. But still the Danish, with only dialectic differences, is the language of society, of the press, and of the pulpit, and is taught in the schools. The Norwegian dialects may be classified in three divisions, correspond-

ing to the natural divisions of the country: the Nordenfjeld group, comprising those spoken in Drontheim and the extreme northern provinces; the Vestenfjeld group, or those spoken west of the mountains in Bergen and the western portion of Christiansand; and the Söndenfjeld group, including those spoken in southern Norway, or to the east of the mountains. Of these divisions, the second approaches the nearest to the Icelandic, while the last named, lying nearer to Christiania, has been most influenced by the Danish. All of them possess some peculiarities in common, which distinguish them from the written speech. The old diphthongs, *au*, *ei*, *øy*, are retained; the hard consonants *k*, *t*, and *p* are placed after as well as before vowels; a distinction is made between the terminations in *a* (*ar*) and those in *e* (*er*); although the genitive form of the nouns is generally lost, the old dative is often retained; the distinction between the masculine and feminine genders of substantives, nearly or quite lost in Danish and Swedish, is still marked; and the definite article (Icel. *hinn*, *hin*, *hit*) requires the substantive which follows it to take the definite termination also, as is still the case in Swedish but not in Danish.—Norway cannot be said to have had a distinct literature until after her union with Sweden. Before that date the writings of her poets, historians, and naturalists properly form a part of Danish literature. With the foundation of the university of Christiania in 1811, and the establishment of political independence in 1814, the records of Norwegian literature begin. For 10 or 20 years after the union it consisted chiefly of political essays, legal tracts, treatises on agriculture and manufactures, and text books for popular instruction. Among the noted publicists and economical writers are K. M. Falsen (died in 1830), Sverstrup (died in 1850), Ræder, Mariboe, Petersen, Blom, and F. Monrad. Keyser and Munch critically edited the ancient Norwegian codes of law; Schweigaard wrote commentaries upon jurisprudence; M. C. S. Aubert and Ræder treated of the principle of jury trial. Other juridical writers are P. O. Lassen, Smidt, Bull, Brandt, and L. K. Daa (born in 1809). Besides the *Statistiske Tabeller* annually issued by the government, J. E. Kraft published a topographical and statistical description of the kingdom (6 vols, 1820-'35); Tvethe issued his *Norges Statistik* in 1848; O. J. Broch's *Statistisk Ordbog* was published annually 1867-'72; A. N. Kjær, chief of the official statistical bureau, has produced many valuable works, among them the *Statistisk Haandbog* (1871); and in the department of social statistics the treatises of Eilert Sundt are well known. In physics, the discoveries of Christopher Hansteen (1784-1873), which were made known in 1819, mark the commencement of a new period in the study of the phenomena of terrestrial magnetism. In the *Gaa Norvegica* of B. M. Keilhau (1797-1858), and in the account of his journey to

Finmark and Spitzbergen, large additions were made to geological science. Theodor Kjerulf (1825-'73) succeeded Keilhau in the professorship of geology at the national university. The explorations of Jens Esmark (1763-1839) among the Norwegian mountains resulted in some well founded theories on glaciers; and J. C. Hörbye has treated (1857) the erosion of mountains. The leading botanists have been Christen Smith (1785-1816), whose travels in the Congo region of Africa were first published by the British government; Sommerfeldt, who, besides a treatise on the cryptogamous plants of Norway, issued in 1826 a large supplement to Wahlenberg's "Laplandic Flora;" Blytt, the first part of whose *Norsk Flora* appeared in 1847; and Schübeler (born in 1815), author of *Die Pflanzenwelt Norwegens*. In zoölogy, the splendid work of Michael Sars (1805-'69), a Norwegian *Fauna Litoralis*, is widely known; and the son of the author, G. O. Sars, sustains in this branch his father's high reputation. The mathematical writings of N. H. Abel (1802-'29) have been translated into French; other authors of distinction in the same branch are B. Holmboe, O. J. Broch, and M. S. Lie. In 1848 Danielson and Boeck published, in Danish at Christiania and in French at Paris, the important results of their investigations into *Spedalskhed* or elephantiasis, which is prevalent in Norway and Iceland; and their work has been followed by another essay by Bidenkap. Boeck was the first to advocate inoculation in syphilitic diseases. F. Holst (born in 1791) greatly contributed by his treatises on the subject to the improvement of the Norwegian hospitals and prisons. Skjelderup published several volumes of interest to the medical student. The schism produced by the labors and writings of Hauge (1771-1824), and the freedom of religious worship secured by the constitution, have produced theological writers of ability. Among them are W. A. Wexels, S. J. Stenersen (1789-1835), O. P. Caspari (born at Dessau in 1814, but for many years attached to the university of Christiania), and somewhat later Tønder, Nissen, G. Johnson, and F. W. Bugge. In metaphysics the only authors of note are M. J. Monrad, C. Heiberg, and G. V. Lyng. The history, philology, and antiquities of Norway have been zealously studied. Jacob Aall (1773-1844) translated the voluminous chronicles of Snorri Sturlason, besides leaving an interesting record of his own times in his *Erindringer* or memoirs; A. Faye published a history of Norway in 1831; Rudolph Keyser followed up his account of the religion of the ancient Northmen (translated by Pennock, New York, 1854) with a more extensive work on the history of the Norwegian church during the Catholic period; and C. C. A. Lange and C. R. Unger have edited a *Diplomatarium Norvegicum*. But the most important national historical work is *Det norske Folks Historie*, by Peder Andreas Munch (1810-'63), in nine volumes. La-

ter historical writers are O. Rygh, J. E. Sars, S. Petersen, and Gustav Storm, whose essay on Snorri Sturlason (1873) is a work of ability. In 1847, by the publication of Munch's edition of the elder Edda, and a grammar and chrestomathy of the old language, was founded the Norwegian school of philology. The works of P. A. Munch, C. R. Unger (born in 1817), and R. Keyser (1803-'65), the leaders in this philological movement, comprise, among many others, a treatise on the oldest form of runic writing, a Gothic and an Old Swedish grammar, and editions of *Fagr-skinna* (1847), *Alexandurs Saga* (1848), *Saga Olafs hins Helga* (1849), *Strengleikur* (1850), *Aslak Bolts Jordbog* (1852), *Stjörn* (1853), *Saga Olafs Tryggvasonar* (1853), *Saga Didriks af Bern* (1853), *Karlamagnus Saga* (1859), *Morkinskinna* (1866), the "Saga of Thomas à Becket" (1868), the *Mariu Saga* (1869), and the *Codex Frisianus* (1870). With the assistance of the government there has been completed (1860-'65) an accurate reprint of the *Flateyjarbok* (*Codex Flateyensis*), containing sagas of the Norwegian kings, and much historical and legendary lore concerning Iceland and the whole European north. The youngest member of this school, Sophus Bugge (born in 1833), has edited several sagas and the best critical edition of the elder Edda. Ivar Andreas Aasen (born in 1813) published *Det norske Folkesprogs Grammatik* (1848) and an *Ordbog* (1850). C. A. Holmboe (born in 1796) has made an important contribution to comparative philology by his "Comparative Lexicon of several of the Indo-European Tongues" (Vienna, 1852), and by other works. The dialects of the Laplanders have been laboriously studied by the missionary Stockfleth (born in 1787), and by I. A. Friis, whose *Lappisk Sproglaere* was issued in 1852, and has been followed by other works. In classical philology the chief laborer is L. C. M. Aubert. The poems and dramas of H. A. Bjerregaard (died in 1842) are national in spirit, but lack originality and brilliancy. Henrik Arnold Wergeland (1808-'45) was for a long time the favorite poet of the Norwegians, and a complete collection of his works in nine volumes has been published. J. S. Welhaven (1807-'73), the eminent rival of Wergeland, wrote numerous lyrics, national dramas, and æsthetical essays, collected in eight volumes (1868). Andreas Munch (born in 1810), a cousin of the historian, by his poetical and dramatic productions has rendered himself one of the most popular of the living poets. His *Digte* (1848), *Nye Digte* (1850), *Reisebilleder* (1851), *Sorg og Trøst* (1852), *Digte og Fortællinger* (1855), and *Reiseminder* (1865) are his chief works. M. C. Hansen (1794-1842) produced a multitude of poems and romances, besides several works on other subjects. P. C. Asbjørnsen and J. Moe, in their *Folkeeventyr* and *Huldreeventyr* (4th ed., 1871), have collected the popular tales which have been orally preserved by the Norwegian peasants for many generations; and M. B. Land-

stad and Sophus Bugge have each edited collections of the old popular ballads. Among the more recent poets, the best known are J. Moe, Kjerulf, Schiwe, Bentsen, Schwach, and Sivertson, and the dramatic writers C. P. Riis and R. Olsen. The most distinguished living writer is Bjørnstjerne Bjørnson (born in 1832), many of whose tales, such as *Arne* and *Synnøve Solbakken*, illustrative of Norwegian peasant life, have been translated into several languages; his other works are the dramas *Mellemstagen*, *Halte Hulda*, *Kong Scerre* (1860), *Sigurd Slembe* (1862), *Sigurd Jorsalfare* (1873), and the epic poem *Arnliot Gelline* (1870). Henrik Ibsen (born in 1828), who has for many years resided in Dresden, has also achieved great success in the dramatic field by his *Kjærlighedens Komædie* (1862), *Kongs-Emnerne* (1864), *Brand* (1867), *Hertog Skule*, and *Keiser og Galilæer* (1874); he has likewise written a long poem, *Peer Gynt*, and a volume of lyrics (1871). Of the writers in the *Folkesprog* or popular dialect the most noted, besides Aasen, are O. Vinje (died 1870), a poet who united great force with a strong satirical humor; Kristofer Janson, long engaged in efforts for the education of the peasant classes, whose most notable works are *Jon Arason* (1867), and *Sigmund Brestesson* (1872), a poem founded on the *Færeyinga Saga*; and Kristofer Bruun. Sympathetic with the same school is Jonas Lie, whose recent novels *Den Fremsynte*, *Tremasteren*, and *Lodsen og hans Hustru* (1874), tales of the coast fisherman's life, have given their author a wide popularity. Two female

writers of fiction, Mrs. Camilla Collett, the sister of Wergeland, and Mrs. Magdalene Thoresen, have published works of merit. The royal Norse academy of sciences, the seat of which is at Drontheim, the university of Christiania, the Norwegian antiquarian society (*Oldskriftselskab*), and the *Selskab for Folkeoplysningens Fremme* have each published transactions and series of works distinguished by zeal and learning.—The best sources of information concerning Norwegian literature are the *Norsk Forfatter-Lexikon* (1863), a dictionary of authors, by J. E. Kraft, and *La Norvège littéraire* (1868), by P. Botten-Hansen.

NORWICH, a town and city, and one of the county seats of New London co., Connecticut, situated at the head of the Thames river, 15 m. from Long Island sound, and 35 m. S. E. of Hartford; pop. in 1860, 14,048; in 1870,

16,653. The town and city are not coextensive. The principal portion of the city lies upon the sides and summit of the eminence that rises between the Yantic and Shetucket rivers, which here unite to form the Thames. The business portion is at the base near the water, in the locality formerly known as Chelsea Landing, while the residences are mostly upon the plateau that extends N. from the brow of the hill. The houses are generally white, and, rising in terraces one above the other, can be seen from a considerable distance down the river, whose elevated banks lend additional attraction to the view. The principal public building is the court house, used for town, city, and county purposes. There is a cemetery tastefully laid out, and in the park a monument has been erected to the soldiers of the civil war. West of the Yantic is a portion of the city known as the West Side or West Chelsea. Greenville, in the N. E. part of the city, on the right bank of the Shetucket,



Norwich, Conn.

contains one of the largest paper mills in New England. The town extends N. W. of the city, in a pleasant valley surrounded by hills. At the falls of the Yantic, about 1 m. from its entrance into the Thames, the river is compressed into a narrow channel, and rushes over a rocky bed having a perpendicular descent of about 50 ft. The "Falls" in this vicinity is an active manufacturing village. Norwich has railroad communication with the principal points in New England by means of the New London Northern and Norwich and Worcester lines, and is connected with New York by daily lines of steamers. The harbor is commodious, and is accessible by vessels drawing 10 ft. of water. It has an important trade in coal, lumber, West India goods, groceries, and drugs. The capital invested in manufacturing and transportation companies amounts to

\$9,000,000. The aggregate capital of the seven national banks is nearly \$3,000,000; the deposits in the three savings banks amount to about \$11,000,000. The principal articles of manufacture are machinery, rolling-mill products, printing presses, firearms, locks, water wheels, type, paper, organs, and cotton and worsted goods. Norwich has good public schools, a free reading room, a public library, one daily and three weekly newspapers, an old ladies' home, and 16 churches. The free academy was built and endowed by the private subscription of \$110,000 by residents of the town, and is open for a full academical education to all its children, free of expense to them, and without regard to sex or condition. —Norwich was settled in 1659. In that year Uncas and his two sons made a formal deed of the site of the old town, 9 m. square, to Major John Mason and 34 other proprietors, and received from the company £70 as a compensation. Its settlement was begun by Major Mason and the Rev. James Fitch, who, with a part of his congregation, removed from Saybrook. The city was incorporated in 1784.

NORWICH, a village and the county seat of Chenango co., New York, on the Chenango river and canal, and on the Delaware, Lackawanna, and Western, and the New York and Oswego Midland railroads, 90 m. W. of Albany; pop. in 1870, 4,279. It has a handsome stone court house, in the Corinthian style, an academy, two banks, manufactories of pianos, hammers, and carriages, two weekly newspapers, and six churches.

NORWICH, a city, capital of the county of Norfolk, England, on the Wensum river, 98 m. N. E. of London; pop. in 1871, 80,390. It is a place of great antiquity, was a flourishing town in the time of Edward the Confessor, and is still surrounded by fragments of its ancient walls, which were flanked with towers and entered by 12 gates. The streets are narrow and mostly unpaved, and the houses are built of brick with rude pointed gables; but the market place is one of the largest in the kingdom. The cathedral, founded in 1094, and chiefly of Norman architecture, is a cruciform structure, with a tower (restored in 1858) and spire rising from the intersection of the nave and transepts to the height of 315 ft. In 1872 there were 67 places of worship, of which 46 belonged to the church of England, 8 to the Baptists, 3 to the Congregationalists, 4 to the Primitive Methodists, and 2 each to the Wesleyans, United Methodists, and Roman Catholics. Norwich has been noted for its woollen fabrics since the reign of Henry I., when a colony of Flemings settled there, and obtained long wool spun in the village of Worstead, 9 m. distant, whence the produce took

the name of worsted. The leading manufactures are shawls, crapes, bombazines, muslin de



Norwich Cathedral.

laine, damasks, camlets, gros de Naples, and bandanna handkerchiefs.

NOSE, the organ of the sense of smell in vertebrated animals, and in the three highest classes connected with the respiratory function. Of the 14 bones which enter into the composition of the cavities of the nose in man, the principal are the nasal, attached more or less perpendicularly to the frontal bone above and to the superior maxillary on the sides; in the lower orders these bones become more horizontal and more developed, as the face and animal propensities predominate over the cranium and the intellect. The nasal cavities, bounded in front by these bones, and separated into two by the vomer, open widely anteriorly to the external air and posteriorly into the pharynx; the upper wall is pierced by numerous foramina, through which enter the filaments of the olfactory nerve, or nerve of smell; the lower wall forms the bony roof of the mouth, and is nearly horizontal; the outer wall is divided into the superior, middle, and inferior meatuses by the turbinated bones, into the first of which open the posterior ethmoidal and sphenoidal sinuses, into the second (much larger) the frontal and anterior ethmoidal sinuses and the great cavity of the antrum, and into

the third the duct of the nasal canal which conveys the tears from the eyes to the nose; from the last also the Eustachian tube, by which the tympanic cavity of the ear communicates with the throat, may be most easily entered, as is frequently necessary in aural surgery; the *septum* or inner wall is a thin vertical partition situated upon the median line, and separating the nasal passages on the right side from those on the left. The suture of the nasal bones in man remains ununited generally until very late in life, in this differing from the condition in the highest apes, in which they are very early consolidated into a single bone with hardly a trace of suture; their inner border is also elevated, so that the depressed nose of the negro has never the flatness of that of the gorilla and chimpanzee. The external prominent part of the nose, which gives the character to the feature, is composed of several cartilages, connected to the bones and to each other by strong fibrous tissue, sufficiently firm to preserve the shape of the organ, and so elastic and flexible as to permit the expansion and contraction of the nostrils in respiration; at the tip of most noses, on the median line, may be felt a fossa or depression bounded on each side by the lateral cartilages, which, with the absence of rigidity, some ethnologists have made characteristic of certain human races, like the Malay and negro. The varying expression given to the face by the movements of the nose depends on the action of its muscles, attached to the cartilages, skin, and upper lip; most of the expressions arising from these movements are disagreeable, indicating either contempt, anger, fear, or pain. The openings of the nose are provided with stiff curved hairs, which prevent the entrance of many particles floating in the air. The mucous membrane lining the nasal passages is of two kinds, viz.: the Schneiderian membrane, occupying the lower portion,

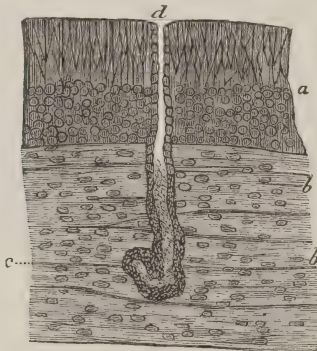


FIG. 1.—Olfactory Membrane of the Sheep, in vertical section.

a. Epithelium. *b.* Fibres of the olfactory nerve. *c.* Mucous follicle. *d.* Orifice of the mucous follicle.

and the olfactory membrane, occupying the upper portion. The Schneiderian membrane is covered with ciliated epithelium, is provided

with compound mucous glandules, and supplied with nerves of ordinary sensibility from the nasal branch of the ophthalmic division of the fifth pair; it is to be considered as forming a part of the respiratory surfaces. The olfactory membrane is covered with non-ciliated epithelium, provided with simple, nearly straight mucous follicles, and supplied with filaments from the olfactory nerve; it constitutes the organ of the special sense of smell. The soft

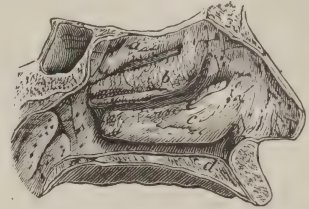


FIG. 2.—Profile View of the Nasal Passages.

a. Superior turbinate bone, covered by its mucous membrane. *b.* Middle do. *c.* Inferior do. *d.* Horizontal or hard palate.

olfactory nerves or nerves of smell arise from the olfactory lobules, which rest, in the interior of the cranium, upon the cribriform plate of the ethmoid bone; the nerves then pierce the ethmoid bone and reach the nasal cavities,

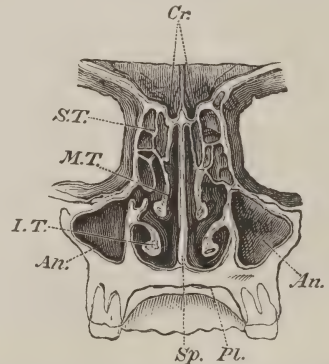


FIG. 3.—Transverse Section of the Nasal Passages.

Cr. Cribriform plate of the ethmoid bone, upon which rest the olfactory lobules and through which pass the filaments of the olfactory nerves. *S. T.* Superior turbinate bone. *M. T.* Middle turbinate bone. *I. T.* Inferior turbinate bone. *An.* Antrum of the superior maxillary bone. *Sp.* Septum of the nares. *Pl.* Hard palate.

being finally distributed to the olfactory membrane upon the upper part of the septum, and upon the superior and middle turbinated bones. —The nose forms one of the characteristic features of the human face, and by physiognomists has been regarded as a faithful index of character. The sense of smell is less developed than that of sight in man, and in comparison with that of some other animals is very feeble, and the more so in proportion to the elevation of the race in the scale of civilization; the blind have a more acute sense of smell to compensate for the deficiency of sight; the Mongolian,

the negro, and the American Indian have a greater development of the internal cavities of the nose than the white races. In man the nose projects beyond the level of the upper jaw, the opening of the nostrils being horizontal and downward; but even in the highest apes this feature is flat, and the nasal orifice vertical and forward. The ethnological characters derived from the shape of the nose are given in the articles on the different races, and in *ETHNOLOGY*. In fishes, breathing by gills, there is no communication between the nose and the mouth or throat, except in the myxinoïds; in batrachians and reptiles, all of which in the adult state breathe more or less by lungs, the nose and mouth communicate, by a short passage as in the frog, or by a long one as in the crocodile; in birds the nostrils open on the back of the bill, generally nearest the base, and are frequently covered by bristly feathers to prevent the entrance of foreign bodies, and they communicate with the mouth behind. In mammals only are found the sinuses and cellular cavities in the frontal, sphenoid, ethmoid, and superior maxillary bones, larger in some than in others; the nasal cartilages are often widely different from those of man, as may be seen in the movable snout of the mole and hog, and in the proboscis of the tapir and elephant, which are only modified and largely developed noses; in cetaceans the nasal openings are on the top of the head, constituting the blow-holes.—There are many congenital defects in which the nose is concerned. It may be almost entirely deficient, partially developed, closed in front, or fissured below; the septum may be distorted or absent; or the organ may be monstrously developed. The skin of the nose is subject to cutaneous eruptions; the numerous small veins may be dilated, giving a red color to the tip, which, from the disturbance and retardation of a naturally slow circulation, is very difficult to remove. In common colds the mucous membrane is gorged with blood, and often so thickened as to interfere with respiration through the nose, and even to close the posterior passage to the throat. Abscesses, chronic thickening, deep ulcerations, ozæna, lupus, polypus, and cancer are common in this organ, and can only be alluded to here. Some of the greatest triumphs of modern reparative surgery may be found in the history of rhinoplastic operations. (See *AUTOPLASTY*.)

NOSTRADAMUS (Fr. NOTREDAME), Michel de, a French astrologer, born of Jewish parents at St. Remy, Provence, Dec. 14, 1503, died at Salon, July 2, 1566. He studied at Avignon and Montpellier, and travelled in the south of France for five years. He was successful in curing the plague in Provence, by means of a powder which he invented. About the year 1547 he began to believe in his own prophetic powers. In 1555 he published in Lyons seven "Centuries" of quatrains; and in 1558 he published a new edition, 1,000 in number, dedicated to King Henry II., whose death in a

tournament the following year was found to be foretold therein. He was made physician in ordinary to Charles IX., and was consulted by all classes of persons for diseases and for the foretelling of fortunes and public events. He is said to have been the first to publish almanacs containing predictions of the weather. Of his "Centuries" the Lyons edition (8vo, 1568) is the best.

NOTARY PUBLIC, an officer appointed to draw up and attest deeds and contracts, and perform other similar functions. The name and office of notary are of Roman origin. The *notarii*, so called from the *note* or short-hand characters in which they minuted the instruments which they drew, had not a public character. They were mere scribes, who wrote out the agreements of those who employed them. The writings thus composed were completed by the signatures of the parties. Unless these signatures were attested by witnesses or verified by proof of the handwriting, the instruments could have no authority in the courts. But it was possible to render them valid by a declaration of their tenor before a magistrate and by registration of them in the public records. Like the *notarii* were the *tabelliones forenses*, who drew up legal documents and statements to be sent to the courts of law or presented to the different civil authorities. The *tabelliones* formed themselves into a guild under a presiding officer. A constitution of Diocletian prescribed a tariff of fees for them. As the craft grew in importance, the state began to prescribe the terms of admission and removal of the members. Laws were made to define the legal effect of the instruments which they framed. It was required that the *tabellio* be present at the execution of the instrument, and affix to it his signature and the date. Three witnesses must also subscribe their names ordinarily, but four were necessary if the principal parties could not read.—In imitation of these Roman officers, the Frankish kings created notaries, and guarded by laws against the abuse of their functions. During the middle ages notaries were appointed directly by the popes or emperors, or under their immediate authority. In France, by an ordinance of 1312, Philip the Fair forbade for the future the creation of notaries to all except prelates, barons, and those to whom appointment pertained as an ancient right in virtue of their estates. From that time onward notaries were invested in France with a qualified judicial character. They had authority, for example, to insert in the memoranda of obligations a clause granting summary execution to the creditor in case of a non-fulfilment of the contract. But this voluntary jurisdiction which notaries had so long possessed in France, was taken from them by the legislation of the republic. They are now public officers, formally recognized indeed as sharers in the civil administration, but deriving their authority from and representing rather the state than the courts.

They are commissioned for life, and can be removed only by judicial decree. They are authorized to draw instruments of various characters; and in matters which are of more than private importance, they retain in their custody the original drafts, and furnish copies of them to the parties concerned. They are often employed under the direction of the courts in making out inventories and in the distribution of estates, and perform those notarial acts which are required by law in respect to wills, gifts, marriage contracts, and protests. Notarial chambers, which consist of deputies chosen by the profession, regulate the rules of practice, decide upon the admission of candidates, and punish members who are guilty of abuse of their office. All documents which were executed in the presence of two notaries, or of one notary and two witnesses, and are attested by them, receive full credence in all courts of law.—Notaries were known in England before the conquest. In the early part of the 14th century they were commonly employed, for in 1347 we find them frequently named in the petitions of the commons to the king. Ever since that time the office has been one of prominence and importance. Until recently the English notary derived his authority to practise from the court of faculties of the archbishop of Canterbury. The ecclesiastical courts were abolished by the statutes 20 and 21 Victoria, c. 77, 85; but these acts did not affect the notaries. Their authority extends to the drawing of deeds relating to real and personal property, to protesting bills of exchange, authenticating and certifying copies of documents, and to the attestation of instruments going abroad. They receive the affidavits of mariners and shipmasters, and draw their protests. English notaries have always considered themselves competent to administer oaths and affirmations.—The functions of notaries in the United States are similar to those exercised by the same officers in England, though in general they seem to be limited in practice to the attestation of writings of a mercantile kind, and to the protestation of bills and notes. They are usually commissioned by the executive of their states, and derive their particular powers from statute provisions. In most of the states acknowledgments of deeds before them have the same validity as those made before justices of the peace, and they are empowered to administer oaths. In those states where the powers of these officers are not distinctly set forth, it may be supposed that they include such acts as attach to the office by general mercantile usage.—In respect to the value of notarial acts in evidence, it may be remarked that the admissibility in evidence of notarial acts done in a foreign country, and their authenticity, rests solely on the ancient mercantile usage, which makes what may be termed the commercial law of nations. In respect to bills of exchange and similar paper of merchants, there is no doubt of the effect of

notarial acts. It is the rule of English and of American law that the minutes of a foreign notary of his protest for non-acceptance, when attested by his signature and notarial seal, are full proof of these facts, and require no auxiliary support. But the principle that the foreign notary's certificate is conclusive evidence only of such acts as he does under the law merchant, has been upheld in a case where a deed of partition made and acknowledged before a foreign notary was pronounced insufficient in respect to the acknowledgment; and in England the certificate of an American notary under seal of the execution of a power of attorney in his presence was not admitted as evidence of the fact, though the notary's certificate was verified by the British consul. Independently therefore of special laws, which in some states indeed give validity to acknowledgments and the like acts if done before foreign notaries, no certificates of theirs which concern matters foreign to the mercantile law will be recognized as evidence. The protest of a promissory note at home is not, unless made so by the local statute, an official notarial act, as the protest of a foreign bill of exchange is; and therefore, after the notary's death, the note of such a protest is not of itself competent evidence in chief. Yet when it is duly authenticated by signature and seal, it will be admitted as secondary evidence of the notarial acts which it recites. So the memoranda entered in the office books of the notary, either by him in person or by his clerk in the ordinary course of business, are admissible in evidence when the party is dead who could directly speak to the fact.

NOTO, a town of Sicily, on a hill within a few miles of the Mediterranean, 14 m. S. W. of Syracuse; pop. about 15,000. It is one of the finest towns on the island, is the seat of a bishop, and has several schools. The ancient town of Notum was flourishing several centuries before the Christian era. Under the Normans it was the capital of S. Sicily, under the name of Val di Noto. It was destroyed by an earthquake in 1693, and the modern town was founded in 1703 about 8 m. N. W. of the old site, now known as Noto Vecchio, where are remains of an amphitheatre and other edifices.

NOTORNIS (Gr. νότος, south, and όρνις, bird), a large bird of the rail family, established by Owen in 1848, on a nearly entire skull sent with those of the *dinornis* from New Zealand. The natives had traditions of the existence of a large rail-like bird which they called *moho*, contemporary with the *moa* or *dinornis*, but it was by them considered extinct like the latter. This bird, which Owen called *N. Mantelli*, was known only by the occasional occurrence of its bones, until Mr. Walter Mantell in 1849 obtained a skin from the South island of New Zealand. A specimen was there taken alive by some sealers after a long chase; it ran very rapidly, and when captured screamed and struggled violently; after having been kept three

or four days, it was killed, and its flesh found delicious; the skin was sent to England, where a description was made by Mr. John Gould, confirming entirely the opinion of Owen based upon the bony structure. The bird had the aspect of a large *porphyrio* in the bill and the color, but had the moderate feet of *tribonyx*, with the rudimentary wings and tail of an ostrich. The length was 26 in., the bill to gape $2\frac{1}{2}$, the wing $8\frac{1}{2}$, and the tarsi and tail each $3\frac{1}{2}$; the bill was shorter than the head, much compressed on the sides, with the culmen elevated and arched, extending on the forehead as far as the posterior angle of the eye; wings very short, rounded, slightly concave; the primaries soft and yielding, the first short, and the third to the seventh equal and longest; feathers of tail soft and loose; tarsi powerful, almost cylindrical, very broad in front and defended by wide scutellæ; anterior toes large and strong, shorter than the tarsus, with powerful hooked nails; hind toe short, strong, rather high up, with a blunt hooked nail. The head, neck, breast, upper part of abdomen and sides purplish blue; back, rump, upper tail coverts, lesser wing coverts, and tertiaries dark olive green tipped with verditer green; on the nape a band of rich blue separating the purplish blue of the neck from the green of the body; wings rich deep blue, the greater coverts tipped with verditer green; tail dark green; lower abdomen, vent, and thighs bluish black; under tail coverts white; bill and feet red. From the thickness of the plumage, and the great length of the feathers of the back, it is believed that this bird inhabited marshy places and coverts of damp ferns; it was essentially terrestrial, yet probably able to swim; though unable to fly, it was a very rapid runner; it was doubtless very shy, keeping concealed, naturally or to avoid enemies, in the darkest and thickest recesses of the islands.

NOTT, Eliphalet, an American educator, born in Ashford, Conn., June 25, 1773, died in Schenectady, N. Y., Jan. 29, 1866. He studied theology, and at the age of 21 was sent as a domestic missionary to central New York. On passing through Cherry Valley, he accepted a call to the pastorate of the Presbyterian church there, and he also became teacher in the academy. Soon afterward he was called to the Presbyterian church at Albany, where he preached his celebrated sermon on the death of Alexander Hamilton. In 1804 he was chosen president of Union college, Schenectady, which place he held until his death. More than 3,700 students graduated during his presidency. In 1854 its semi-centennial anniversary was celebrated, when several hundred of the men who had graduated under him assembled. Besides occasional addresses and discourses, Dr. Nott published "Counsels to Young Men" (1810, often republished), and "Lectures on Temperance" (1847). He gave much attention to physical science, especially to the laws of heat, and obtained about 30 patents for inventions

in this department; among the most notable of these was the first stove for burning anthracite coal, which bore his name, and was for many years extensively used.

NOTT, Josiah Clark, an American ethnologist, born in Columbia, S. C., March 31, 1804, died in Mobile, March 31, 1873. He graduated at the South Carolina college in 1824, took the degree of M. D. in Philadelphia in 1827, and was for two years demonstrator of anatomy to Dr. Physick, when he returned to Columbia and commenced practice. In 1835-'6 he studied medicine, natural history, and the kindred sciences in Europe, and after his return practised medicine in Mobile. Besides contributing many articles on professional and similar topics to medical journals, he published several ethnological works. Among these are "Two Lectures on the Connection between the Biblical and Physical History of Man" (8vo, New York, 1849); "The Physical History of the Jewish Race" (Charleston, 1850); "Types of Mankind" (4to, Philadelphia, 1854); and "Indigenous Races of the Earth" (4to, Philadelphia, 1857). The last two were prepared in connection with Mr. George R. Gliddon. The object of these works is to refute the theory of the unity of the human race, by showing that the present types of mankind lived around the Mediterranean 3,000 years B. C., and that there is no evidence that, during the last 5,000 years, one type has been changed into another. In 1857 Dr. Nott was called to the chair of anatomy in the university of Louisiana, but in 1858 established a medical college in Mobile, which was made a branch of the state university.

NOTTINGHAM, a town of England, capital of Nottinghamshire, and a county in itself, situated on the river Leen near its junction with the Trent, and on the Nottingham canal and the Midland railway, 108 m. N. N. W. of London; pop. in 1871, 86,621. The suburban villages dependent upon Nottingham have a population of about 40,000. The town is built on the side of a steep hill, and many of the streets rise in terraces. On the summit of a precipitous rock 133 ft. above the surrounding meadows are the ruins of "the castle," a large mansion built by the duke of Newcastle in 1674, on the site of a fortress erected in the time of William the Conqueror; it was burned in the reform riots of 1831. In 1872 there were 77 places of worship, of which 23 belonged to the church of England. There are five lunatic and blind asylums, hospitals, several libraries, and a mechanics' institute. The principal manufactures are lace, which was here first made by machinery, cotton and silk hosiery, and ale. —Nottingham is a place of great antiquity, and derives its name from the Saxon Snotingham, which is descriptive of its position as a retreat in rocks, since there were formerly many caverns in the soft rock on which its castle was built, of which a few remain. During the wars of the barons the castle was attacked and taken by the earl of Derby, and after the deposition

of Edward II. it became the residence of Queen Isabella and her paramour the earl of March. Several parliaments were held here. In 1485 Richard III. marched from Nottingham, where he had assembled his forces, to the battle of Bosworth field. In the civil war Charles I. set up his standard in Nottingham in 1642, but the place fell in 1643.

NOTTINGHAM, Earl of. See HOWARD, CHARLES.

NOTTINGHAMSHIRE, or *Notts*, an inland county of England, bordering on the counties of York, Lincoln, Leicester, and Derby; area, 822 sq. m.; pop. in 1871, 319,956. The face of the country is generally level, with moderate undulations. The royal forest of Sherwood, the traditional scene of Robin Hood's exploits, was in this county, lying N. E. of Nottingham, and extending about 21 m. in length by a breadth varying between 7 and 9 m. A portion of this forest is still in existence, forming part of Earl Manvers's park at Thoresby, and called Birkland forest. All this tract, with the above and a few other trifling exceptions, has now been enclosed. The geological formation on which the county rests is the new red sandstone; and red marl, and its varieties of sand, gravelly sand, and red and white sandstone, constitute by far the greater part of the soil. Coal pits have been sunk to considerable depths in various places; the seams vary in thickness from 1 to 6 ft.; the coal is inferior to that of Newcastle. Gypsum is extensively worked near Newark, and a very good yellowish freestone for building and paving is obtained in various places; marl is also found throughout the county. The climate is healthy and comparatively dry. The principal crops are wheat, barley, oats, turnips, and clover. There are excellent market gardens and some good orchards near the principal towns. The river Trent, which has a course of about 60 m. through Nottinghamshire, is a broad navigable stream bordered by level lands. There are many canals and railways. The chief manufactures are malt, paper, iron, ropes, candles, ale, earthenware, lace, and hosiery. The principal towns, besides Nottingham, the capital, are Newark, East Retford, Bingham, Mansfield, Southwell, and Worksop.

NOTTOWAY, a S. E. county of Virginia, bounded S. by the Nottoway river; area, about 300 sq. m.; pop. in 1870, 9,291, of whom 7,050 were colored. The Richmond, Danville, and Petersburg, and the Atlantic, Mississippi, and Ohio railroads intersect it. The chief productions in 1870 were 37,907 bushels of wheat, 82,686 of Indian corn, 55,754 of oats, 653,296 lbs. of tobacco, and 37,135 of butter. There were 466 horses, 760 milch cows, 1,140 other cattle, 903 sheep, and 2,898 swine. Capital, Nottoway Court House.

NOTTOWAYS, a tribe of American Indians, one of the most southerly tribes of the Huron Iroquois family, residing to the last on the river in Virginia bearing their name, and calling themselves Cherohakah. They preserved their

independence and numbers later than the Powhatans, and at the end of the 17th century had 130 warriors. They appear in a Virginia treaty with the Five Nations in 1722, and in 1729 numbered 200. Their round-topped bark cabins were enclosed in a square palisade fort on the west bank of the river. Gov. Spottswood and others caused the sons of chiefs to be educated, but all attempts to elevate them failed. Jefferson in 1781 said that there was not a male left. The reserve allotted to them contained 27,000 acres, but they cultivated very little. In 1822 only Edie Turner, recognized as queen, and two others spoke the language, whose vocabulary proves its connection with the Huron, Iroquois, and Susquehanna.

NOUREDDIN (MALEK AL-ADEL NUR ED-DIN MAHMOUD), a Mohammedan ruler of Syria and Egypt, born in Damascus about 1116, died there in 1173 or 1174. He succeeded his father Zenghi, of the Atabek dynasty, in 1145, and made Aleppo his capital. Soon afterward he expelled the Christians from Edessa, demolished the walls, and massacred the inhabitants. Subsequently he invaded Antioch, and defeated and slew Prince Raymond. He was routed in the following year by Jocelin de Courtenay, but afterward captured that leader. The whole of northern Syria now fell into his hands. In 1154 the Damascenes, dreading an attack from Baldwin III., king of Jerusalem, sought the protection of Nouredin, who in 1156 entered Damascus, rebuilt and adorned it, and made it his capital. In 1159 the Greek emperor, Manuel Comnenus, formed an alliance with the Franks of Antioch against him, but was bought off, and Nouredin defeated and captured Reginald de Châtillon, prince of Antioch. He now sent to Egypt an army under Shirkuh to support the emir Shawer against his rival Ed-Dargam. Shawer, having gained the throne, formed an alliance with the Franks and drove Nouredin's troops out of Egypt. In a second expedition Shirkuh defeated the Franks, put Shawer to death, and ruled Egypt as the lieutenant of Nouredin, who received from the caliph of Bagdad the title of sultan and the direct investiture of Syria and Egypt. Moslems and Christians equally extol his character.

NOURRISSON, Jean Félix, a French philosopher, born at Thiers in 1825. He became professor of philosophy at Clermont and in Paris, and in 1870 succeeded the duke de Broglie in the academy of moral and political sciences. A new chair of the history of modern philosophy was established for him, Jan. 1, 1874, at the collège de France. His *Tableau des progrès de la pensée humaine depuis Thalès jusqu'à Leibnitz* (1858), *La nature humaine* (1865), and *La philosophie de Saint Augustin* (1865), received academical prizes. Among his other works are *Les pères de l'Eglise latine* (1858), and *De la liberté et du hasard* (1870).

NOVALIS. See HARDENBERG, FRIEDRICH VON.

NOVARA. I. A N. W. province of Italy, in Piedmont, bordering on Switzerland, bounded

E. by the Lago Maggiore and the river Ticino, S. E. by the province of Pavia, S. by the Po, which separates it from the province of Alessandria, and W. by the province of Turin; area, 2,526 sq. m.; pop. in 1872, 624,985. The principal part of this province belonged to the former duchy of Milan, and is covered by the main ridge of the Alps, which encloses the valley of the Toce or Tosa, into which numerous lateral valleys open, each adding its tributary stream to the Toce, which finally discharges its waters into the Lago Maggiore. The soil is noted for its fertility. The principal products are grain, rice, hemp, and silk. It is divided into the districts of Biella, Novara, Ossola, Pallanza, Valsesia, and Vercelli.

II. A city, capital of the province, on the high road from Milan to Turin, 26 m. W. of Milan; pop. in 1872, 29,516. It is surrounded with walls and bastions. Parts of the old fortifications are dismantled, and afford pleasant walks. The cathedral is celebrated for its splendid high altar, for its frescoes by Luini and sculptures by Thorwaldsen, and for its archives, rich in antiquities of the lower empire and the middle ages, and above all for its music. In Novara the priest Dolcino was condemned in 1307 for preaching Manicheism and communistic principles, and was burned alive at Vercelli together with his mistress Margaret, a nun whom he had taken from her convent. In the battle fought at Novara, March 23, 1849, between the Sardinians under the Polish general Chrzanowski and the Austrians under Radetzky, the former were completely routed, which led to the abdication of Charles Albert in favor of his son Victor Emanuel.

NOVA SCOTIA, a province of the Dominion of Canada, situated between lat. $43^{\circ} 26'$ and $47^{\circ} 5' N.$, and lon. $59^{\circ} 40'$ and $66^{\circ} 25' W.$ It consists of the peninsula of Nova Scotia and the island of Cape Breton, separated from it by the gut of Canso, 1 m. wide. (See **CAPE BRETON**.) The peninsula, inclusive of the adjoining islets, is situated between lat. $43^{\circ} 26'$ and $46^{\circ} N.$, and lon. 61° and $66^{\circ} 25' W.$; it is bounded N. by Northumberland strait, separating it from Prince Edward island, and by the gulf of St. Lawrence, N. E. by the gut of Canso, S. E. and S. W. by the Atlantic ocean, and N. W. by the bay of Fundy and New Brunswick, with which it is connected by an isthmus 14 m. wide, separating Northumberland strait from the bay of Fundy. It is 260 m. long from N. E. to S. W., and 65 m. in average breadth. Its area, according to the Canadian census of 1871, is 16,956 sq. m., and that of Cape Breton 4,775 sq. m.; of the entire province, 21,731 sq. m. The province is divided into 18 counties, viz.: Annapolis, Antigonish, Cape Breton, Colchester, Cumberland, Digby, Guysborough, Halifax, Hants, Inverness, King's, Lunenburg, Pictou, Queen's, Richmond, Shelburne, Victoria, and Yarmouth. The capital, commercial metropolis, and largest city is Halifax, with 29,582 inhabitants in 1871. Dartmouth (pop.

4,358) and Pictou (3,462) are incorporated towns. Yarmouth (pop. 3,500), Liverpool (3,000), Windsor (3,000), Sydney (2,900), Sydney Mines (2,500), Truro (2,500), Amherst (2,000), Lunenburg (1,500), Annapolis, Antigonish, Arichat, Bridgewater, Digby, and Shelburne are important places. The population of the province in 1784 was about 20,000. According to subsequent censuses it has been as follows: 1806, 67,515; 1817, 91,913; 1827, 142,578; 1838, 208,237; 1851, 276,117; 1861, 330,857; 1871, 387,800, of whom 75,483 resided on Cape Breton. Of the total population in 1871, 351,360 were born in the province, 3,413 in New Brunswick, 3,210 in Prince Edward island and Newfoundland, 577 in other parts of British America, 2,239 in the United States, and 25,882 in the British isles, of whom 14,316 were natives of Scotland, 7,558 of Ireland, and 4,008 of England and Wales; 130,741 were of Scotch, 113,520 of English, 62,851 of Irish, 32,833 of French, 31,942 of German, 6,212 of African, 2,868 of Dutch, 1,775 of Swiss, and 1,112 of Welsh origin, and 1,666 were Indians (Micmacs and Malicetes). There were 193,792 males and 194,008 females; 31,332 persons (13,719 males and 17,613 females) over 20 years of age unable to read, and 46,522 (18,961 males and 27,561 females) unable to write; 1,254 of unsound mind, 441 deaf and dumb, and 328 blind. The number of families was 67,811; of occupied dwellings, 62,501. Of the 118,465 persons returned as engaged in occupations, 49,769 belonged to the agricultural class, 13,351 to the commercial, 6,755 to the domestic, 34,547 to the industrial, and 4,151 to the professional; unclassified, 9,892.—The surface of the peninsula is undulating, and though there are no mountains there are several ranges of hills, most of which traverse the country in an E. and W. direction. The Cobequid range runs through Cumberland and part of Colchester co., the highest points being 1,100 ft. above the level of the sea. On the shore of the Atlantic the land is hilly and rugged, and for the most part continues to be so from 3 to 5 m. inland. The shore of the bay of Fundy S. of Mines basin is precipitous. The entire province has a coast line, not counting indentations of the land, of 1,170 m. The shores of the peninsula are indented with a great number of excellent bays and harbors, and between Halifax and the gut of Canso alone there are 26 commodious havens, 12 of which will accommodate ships of the line. Some of the principal inlets are Chedabucto bay, at the entrance of the gut of Canso; Halifax harbor and Margaret's and Mahone bays, on the S. E. coast; St. Mary's bay, Annapolis basin, Mines basin, and Chignecto bay, on the bay of Fundy; and Pictou harbor, on Northumberland strait. Among the most remarkable headlands are Cape St. George, at the N., and Cape Canso, at the S. entrance of the gut of Canso; Cape Sambro, S. of the entrance to Halifax harbor; Cape Sable, the S. extremity of the province; and

Cape Chignecto, at the end of a peninsula jutting out into the bay of Fundy from the isthmus which connects Nova Scotia with the mainland, and having at either side of it Mines basin and Chignecto bay. The coasts throughout are lined with small islands, close to which there is deep water. Sable island in the Atlantic, 100 m. S. E. of the peninsula, belongs to the province. There are numerous small rivers, mostly navigable by coasting vessels for short distances. The most important are the Shubenacadie, Avon, and Annapolis, emptying into the bay of Fundy, and the Clyde, Liverpool, La Have, Musquodoboit, and St. Mary's, into the Atlantic. The surface is interspersed with numerous lakes and ponds, the largest being Lake Rossignol in the southwest, 10 or 15 m. long, by about 5 m. wide.—The geological formations of Nova Scotia range lengthwise with the peninsula from S. W. to N. E. Along the Atlantic coast nearly half the breadth is occupied by the lower Silurian, N. W. of which the country, including the isthmus between the bay of Fundy and Northumberland strait, consists for the most part of the upper Silurian and carboniferous groups. Along the bay of Fundy S. of Mines basin is a narrow belt of triassic rocks, and in Annapolis co. occurs a small area of the Devonian formation. Granite, syenite, &c., are found in isolated localities in various parts of the peninsula. Cape Breton is occupied by the upper Silurian and carboniferous formations, with occasional areas of granite, syenite, &c. The most valuable mineral products are bituminous coal, gold, and gypsum. The coal is found chiefly in the N. E. part of the peninsula and on Cape Breton, the three most productive counties being Cape Breton (S. E. portion of the island), Pictou, and Cumberland. Nearly all the gold has been mined in districts scattered through the lower Silurian belt. Guysborough co. produces more than half, Halifax and Hants cos. standing next. There are between 30 and 40 mines in operation. Gypsum is quarried chiefly in Hants co., but it occurs throughout the N. E. portion of the peninsula and on Cape Breton. Iron is mined in Annapolis, Colchester, and Pictou cos. to a limited extent only; but a superior quality of ore is abundant there, and also in Cumberland co. and on Cape Breton. Galena and copper ore occur in various localities. Limestone, freestone, granite, and marble suitable for building purposes, and clay for brick making, are common. The granite of Shelburne co. is celebrated. Grindstones are manufactured from the sandstone strata, chiefly in Cumberland co. The mineral product of the province in 1874 was valued at \$2,104,633, viz.: coal (872,720 tons), \$1,787,098; gold (9,141 oz.), \$164,538; gypsum (104,140 tons), \$104,140; other products, \$48,857. The total yield of coal from 1827 to 1874 inclusive was 13,752,618 tons. The gold product from the opening of the mines in 1861 to the close of 1874 was about 260,000 oz., worth \$4,790,000.

—The climate is remarkably healthy, and its rigor is greatly moderated by the almost insular position of the country and by the Gulf stream, which keeps the ports facing the Atlantic free from ice in winter. The thermometer ranges from more than 20° below zero to more than 90° above. Though the spring is backward, vegetation is remarkably rapid. The temperature sometimes varies 50° in 24 hours; but the weather is considered preferable to that of most other parts of Canada, as it is milder in winter and not so excessively hot in summer. The mean temperature of the western (where the thermometer rarely falls below zero) is higher than that of the eastern counties. Dense fogs are prevalent in spring and summer both in the bay of Fundy and along the Atlantic coast, but they do not extend far inland. The mean temperature at Digby, in the southwest, for the year ending May 31, 1873, was 43·6°; at Halifax, 42·8°; at Pictou in the northeast, 41°; at Sydney, Cape Breton, 40°. At Halifax the mean temperature of summer was 62°; autumn, 48·4°; winter, 22·1°; spring, 38·8°; warmest month (July), 64·8°; coldest (February), 20·6°; maximum temperature, 93·1°; minimum, —14·4°. The total fall of rain during the year at the same place was 40·04 inches; of snow, 103·4 inches; total precipitation of rain and melted snow, 51·1 inches.—Along the S. shore the soil of the highlands is light and poor, but toward the north there are large tracts of fertile uplands. The valleys are exceedingly rich. Nova Scotia has extensive tracts of woodland, from which lumber and ship timber are obtained. Oak, elm, maple, beech, birch, ash, larch, poplar, spruce, pine, hemlock, &c., attain a large size. The rock maple yields sugar. Currants, gooseberries, strawberries, blackberries, blueberries, &c., are abundant. Apples, pears, plums, and cherries grow well, the apple orchards of Annapolis and King's cos. being particularly productive. The principal agricultural products are wheat, rye, oats, barley, buckwheat, Indian corn, peas and beans, potatoes, turnips and other root crops, hay, vegetables, and dairy products. The season in most parts is rather short for Indian corn, but it yields a full crop in Annapolis and King's cos. There are considerable tracts of marshland reclaimed from the sea along the bay of Fundy by means of dikes, which produce abundant crops of grass. Considerable numbers of horses, cattle, sheep, and swine are kept. The wild animals and birds are the same as those generally found in other parts of North America, but, with the exception of some of the smaller species, their numbers have been greatly reduced. The adjacent waters swarm with fish of various kinds. —The manufactures of the province are limited, consisting chiefly of coarse cloths (homespun) made and generally worn by the farming population, coarse flannels, bed linen, blankets, carpets and tweeds, leather, boots and shoes, saddlery and harness, furniture, agricultural

implements, and in the vicinity of Halifax tobacco, paper, machinery, nails, gunpowder, carriages, pianos, &c. Ship building is extensively carried on. (For industrial statistics, see APPENDIX to this volume.) The fisheries of Nova Scotia are of great value, and constitute one of the chief industries of the province. The number of men employed during the year ending June 30, 1874, was 21,031; number of vessels, 529, with an aggregate tonnage of 20,163; number of boats, 8,923; value of vessels and boats, \$1,024,905; value of nets and weirs, \$568,426; value of catch, \$6,652,301 59. The chief varieties taken were cod, mackerel, lobsters, herring, salmon, and hake. The value of fish oil preserved (included in the above total) was \$188,878 30. The province has an important foreign commerce. The value of goods entered for consumption during the year ending June 30, 1874, was \$10,907,380; value of exports, \$7,656,547, viz.: products of the mine, \$1,050,186; of the fisheries, \$3,791,152; of the forest, \$1,356,752; animals and their produce, \$334,449; agricultural products, \$225,340; manufactures, \$418,808; miscellaneous articles, including goods not the produce of Canada, \$479,860. The principal countries to which the exports are taken are the West Indies, United States, and Great Britain. The chief articles of import are cottons, silks, woollens, hardware, and other manufactured goods, molasses, sugar, and spirits. The number of entrances was 4,424, with an aggregate tonnage of 959,114, of which 1,850, of 406,988 tons, were in ballast; clearances, 3,752, aggregate tonnage 881,263, of which 729, of 205,678 tons, were in ballast; built during the year, 181 vessels, of 74,769 tons. The number of vessels belonging in the province at the close of 1873 was 2,803, with an aggregate tonnage of 449,701. There are 306 m. of railway, viz.: Intercolonial, from Halifax to St. John, N. B., 276 m., of which 138 m. are in Nova Scotia; branch of the Intercolonial, from Truro to Pictou, 52 m.; and Windsor and Annapolis, from Windsor Junction on the Intercolonial to Annapolis, 116 m. About 100 m. more are in course of construction, viz.: Western Counties, from Annapolis to Yarmouth, and Springhill and Parrsborough. The Shubenacadie canal (30 m. long), in connection with a chain of lakes and the Shubenacadie river, forms an inland water communication from the harbor of Halifax to Cobequid bay at the head of Mines basin. A canal less than half a mile long connects the Bras d'Or with the Atlantic coast of Cape Breton opposite Madame island. There are ten banks, with an aggregate capital of about \$3,000,000, besides branches of banks of other provinces. The deposits in the government savings banks, exclusive of post-office savings banks, on May 31, 1874, amounted to \$1,462,318 04.—The executive government is administered by a lieutenant governor appointed by the governor general of the Dominion in council, assisted by an executive council of

nine members (treasurer, attorney general, provincial secretary, commissioner of public works and mines, commissioner of crown lands, and four without office), appointed by himself and responsible to the assembly. The legislative power is vested in a legislative council of 21 members appointed by the lieutenant governor for life, and a house of assembly of 38 members elected by the qualified voters of the counties for four years. Voting is by ballot, and a small property qualification is required. The supreme court, having law and equity jurisdiction throughout the province, consists of a chief justice, a judge in equity, and five associates, appointed by the governor general in council for life; and there are a court of error, consisting of the lieutenant governor and council; a court of divorce and matrimonial causes, held by a justice of the supreme court; a vice-admiralty court, held by the chief justice; a probate court for each county; and a county court for each county. Nova Scotia is entitled to 12 senators and 21 members of the house of commons in the Dominion parliament. The balance in the provincial treasury on Jan. 1, 1873, was \$38,916 41; receipts during the year, \$672,551 97, including \$481,106 30 subsidy from the Dominion government; total, \$711,468 38. The expenditures amounted to \$681,275 23; balance in treasury on Jan. 1 1874, \$30,193 15. The following were the principal items of expenditure: road service, \$215,416 27; education, \$180,000; local works, \$64,000; legislative expenses, \$44,102 45; lunatic asylum (construction), \$34,000; salaries of officers of government, \$21,497 90; poor's asylum, \$18,676 88; steamboats, packets, and ferries, \$11,776; navigation securities, \$11,468 98; mines, \$10,500; immigration, \$7,772 24; public printing, \$4,818 25; provincial and city hospital, \$4,000; transient poor, \$2,587 50; blind asylum, \$1,250. The provincial debt in 1875 amounted to \$9,186,756.—The Nova Scotia hospital for the insane, at Halifax, was opened in 1859. The number of patients under treatment in 1872 was 329 (166 males and 163 females); remaining at the close of the year, 259 (130 males and 129 females). The institution is supported partly by the counties, partly by the province, and partly by pay patients. The institution for the deaf and dumb and the blind asylum are also at Halifax. The former in 1873 had 40 pupils (partly from other provinces), and the latter 15. They receive aid from the provincial government, which also contributes to the support of the poor's asylum and the city hospital in Halifax. The number of convicts in the penitentiary at Halifax at the close of 1873 was 27.—Nova Scotia has a system of free public schools, organized in 1864. The schools are under the general supervision of the provincial superintendent of education with inspectors for the several counties, and are immediately managed by boards of commission-

ers for the counties and of trustees for the different sections or districts. The number of schools in operation during the summer term ending Oct. 31, 1874, was 1,673; number of teachers, 1,744 (602 males and 1,142 females); number of pupils registered, 79,910; average daily attendance, 46,233; number of different children at school some portion of the year ending on the above date, 93,512 (48,604 males and 44,908 females); number of school sections, 1,932, of which 210 had no school any por-

tion of the year; value of school property, \$830,926 41; number of pupils for whom accommodation is provided, 88,258. Included in the above figures are 10 county academies, with 45 teachers and 2,614 pupils enrolled during the year. Aid was granted from the provincial treasury to four special academies, having 14 teachers and 370 pupils, and also to Mount Allison male and female academies in New Brunswick. There are five colleges, as follows, with their statistics for 1874:

NAME.	Location.	Date of foundation.	Denomination.	Number of instructors.	Number of students.	Volumes in library.
King's college and university.....	Windsor.....	1788	Episcopal.....	5	17	6,400
St. Mary's college.....	Halifax.....	1840	Roman Catholic.....	4	46	1,400
Dalhousie college and university....	Halifax.....	1820	Presbyterian.....	7	78	1,373
Acadia college.....	Wolfville.....	1887	Baptist.....	7	39	3,417
St. Francis Xavier college.....	Antigonish.....	1855	Roman Catholic.....	3	41	2,096

These receive small grants from the provincial treasury, as does also Mount Allison college in New Brunswick. In Dalhousie university a medical department was organized in 1868, which in 1874 had 11 professors and 29 students. In Halifax is situated the theological department of the college of the Presbyterian church of the lower provinces of British North America. The Halifax school of medicine was incorporated in 1873. The provincial normal and model schools are at Truro. The number of teachers in the normal school in 1874 was 4; of pupils, 118. In the model school there were 9 teachers and about 550 pupils. The census of 1871 enumerates five young ladies' boarding schools, with 146 pupils. The total expenditure for educational purposes in 1874 was \$619,361 87, viz.: public schools, \$552,221 40; normal and model schools, \$4,733; special academies, \$26,970; colleges, \$35,337 47. Of these sums \$175,013 65 was derived from the provincial treasury, viz.: for public schools, \$157,480 65; for normal and model schools, \$4,733; for special academies, \$6,800; for colleges, \$6,000. Of the expenditure for public schools, \$107,301 39 was derived from county tax and \$287,349 30 from taxation in the different school sections. The number of newspapers and periodicals published in the province in 1874 was 38, viz.: 4 daily, 5 tri-weekly, 24 weekly, 1 bi-weekly, and 4 monthly.—The following table from the census of 1871 gives the number of churches, buildings attached, and adherents of the principal denominations:

DENOMINATIONS.	Churches.	Buildings.	Adherents.
Baptist.....	234	267	73,394
Episcopal.....	142	193	55,124
Methodist.....	157	196	40,871
Presbyterian.....	197	222	103,539
Roman Catholic.....	120	182	102,001
Miscellaneous.....	47	47	12,871
Total.....	897	1,107	387,800

Of the Baptists 19,032 were Freewill Baptists, and of the Methodists 38,683 were Wesleyans.

Among the miscellaneous are included 4,958 Lutherans, 2,538 Congregationalists, 1,555 Christian Conference, 869 Adventists, 647 Universalists, and 128 Bible Believers.—Nova Scotia is said to have been discovered by the Cabots in 1497; but the first attempt to colonize it was made by De Monts and some other Frenchmen, together with a few Jesuits, in 1604. They called the country Acadia, and for eight years made efforts to form settlements at Port Royal (now Annapolis) and some other places; but they were at length expelled by the colonists of Virginia, who claimed Nova Scotia by right of original discovery. In 1621 Sir William Alexander obtained a grant of the peninsula from James I., and in the patent it was called Nova Scotia. Alexander's intention was to colonize the country upon an extensive scale; but when the colonists arrived, in 1623, they found the localities where they intended to form settlements already occupied by foreign adventurers, and returned to their native country. In the reign of Charles I. the Nova Scotia baronets were created. They were not to exceed 150 in number, and were in fact a kind of joint stock company for colonizing the country. (See ALEXANDER, WILLIAM.) The French obtained a footing in Nova Scotia a second time, and were not subdued till Cromwell sent a strong force against them in 1654. England ceded the country to France by the treaty of Breda in 1667; but the English continued from time to time to ravage the French settlements, and in 1713 Nova Scotia was restored to them. For some years it was much neglected; but in 1748 efforts were made to colonize it by emigrants sent out at the expense of the British government. Some 4,000 settlers and their families reached the colony in this way, and founded the town of Halifax. The French, who were still numerous, caused considerable annoyance and loss to the English by joining the Indians in making war upon them, and they were at length mostly expelled. (See ACADIA.) A constitution, with an elective assembly, was granted to Nova Scotia in 1758;

and by the treaty of Paris (1763) France renounced all future claim upon any of her former possessions in North America. The same year Cape Breton and Prince Edward island were annexed to Nova Scotia, but the latter was separated from it in 1770. New Brunswick and Cape Breton were separated from Nova Scotia in 1784, but the latter was reannexed in 1819. After the close of the American revolution large numbers of royalist refugees from the United States settled in Nova Scotia, and their descendants now form a large portion of the population. Responsible government was introduced in 1848. In 1867 Nova Scotia became one of the original provinces of the Dominion of Canada.—See “An Historical and Statistical Account of Nova Scotia,” by Thomas C. Haliburton (Halifax, 1829); “History of Nova Scotia,” &c., by R. M. Martin (London, 1837); “Geological Survey of Nova Scotia and Cape Breton,” by D. Honeyman (Halifax, 1864); “Acadian Geology,” by J. W. Dawson (London, 1868); “Selections from the Public Documents of the Province of Nova Scotia,” by Thomas B. Akins (Halifax, 1869); and “The Mineralogy of Nova Scotia,” by Henry How (Halifax, 1869).

NOVATIANS, a schismatical sect which originated in the 3d century, so called from their founder Novatian (Novatianus). He was a priest at Rome, who by his learning and eloquence won a high reputation. It has been inferred from uncertain data that he professed the stoic philosophy before becoming a Christian; and he was distinguished after his baptism by his rigid ascetic life. He held that persons who had committed the more grievous sins, and especially those who had denied their faith during the Decian persecution, ought not to be received again into the church. One of the foremost defenders of the contrary opinion was the priest Cornelius, who in 250 succeeded Fabian in the see of Rome. Novatian, unable to prevent his election, withdrew from communion with him, was excommunicated by a council held at Rome in 251, and was almost immediately afterward set up as a rival bishop by his own party. He tried in vain to obtain fellowship with the great churches of Antioch, Alexandria, and Carthage, but found his principal coadjutor in Novatus, a Carthaginian priest, known by his opposition to St. Cyprian. Though differing widely on the administration of public penance, they agreed in their notions about the constitution of the church. According to Novatian, the chief character of the true church is purity and holiness. Every church society that tolerates in its bosom or readmits to its communion persons who by gross sins have broken their baptismal vows, ceases by that very act to be a true Christian church. Hence the Novatians, considering themselves to be the only pure church, called themselves *oi καθαροί*, “the pure.” They also held that members are made impure by outward connection with the impure in the

same communion, and that the ministerial powers transmitted in the hierarchy are lost by the same cause. The sect survived its founder about three centuries.

NOVATION, a law term introduced recently into use by English and American lawyers, from the Roman civil law. It may be defined as the creation of a new debt or contract in substitution for an old one. It differs from a mere renewal, such as takes place when A renews a credit he has given B, or receives a new debt or obligation from B in payment of an old one. To a novation there are three parties. It takes place when A owes B, and C owes A, and A transfers to B in payment of his debt C's debt to him, A. The effect of this is, that A is no longer the debtor of B nor the creditor of C; and B is no longer the creditor of A, but has become the creditor of C; and C is no longer the debtor of A, but has become the debtor of B. In the civil law, the new contract of C to pay B, and the discharge of A's debt to B by the transfer of A's claim on C, would be regarded as different forms of novation. By our law, however, it is one thing, and the whole transaction forms one novation. It is a universal principle in the law of England and of this country, that a promise can be enforced at law only when it is founded upon a consideration. This rule is applied to the case of novation; the effect of it is, that the original liabilities must be extinguished and discharged by the novation, and their discharge is then a sufficient consideration for the new liabilities. Thus, C becomes the debtor of B by the above described novation; and when B claims the debt of C, the consideration on which the claim can be upheld is the fact that C's debt to A was discharged. So if B claims the debt from A, and A interposes his agreement to release him, that agreement is valid only because B has received C's debt to A by way of consideration for his release of A. Thus all the parts of this transaction are mutually connected and dependent. Hence, an order by a creditor to his debtor, directing him to pay the debt to some one to whom the creditor is indebted, operates as the substitution of a new debt for an old only when the order is accepted, and when the original creditor of him who drew the order has agreed to receive the accepted order in payment of his claim. This transaction may be oral only, none of the promises being in writing, because C, the original debtor of A, does not undertake to pay A's debt to B, inasmuch as A's debt is entirely discharged by the novation; but C contracts a new debt to B. This therefore does not come under the provision of the statute of frauds, requiring that the promise to pay the debt of another should be in writing. Hence, also, if after the transaction is complete C wholly fails to pay B, B's claim against A does not revive, for the reason that A's debt to B was wholly discharged; and this is reasonable, because C's debt to A was wholly discharged, and therefore A would have

no claim over on C, if he, A, were obliged to pay his original debt to B.

NOVA ZEMBLA (Russ. *Novaya Zemlya*, new land), several closely contiguous islands in the Arctic ocean, directly N. of the boundary line between Europe and Asia, and stretching N. N. E. and S. S. W. between lat. $70^{\circ} 30'$ and $77^{\circ} N.$, and lon. $51^{\circ} 30'$ and $67^{\circ} 30' E.$, with a total length of about 500 m. and an estimated average breadth of 60 m. The territory belongs to Russia, and is subject to the government of Archangel. Nova Zembla is separated from the island of Vaigatch, which lies close to the mainland, by the strait of Kara (more properly called Burrough's strait), and from the continents of Europe and Asia by the sea of Kara. There are two, or at most three large islands, the southernmost of which is bounded N. by a navigable but narrow strait known as the Matotchkin Shar. Still further N., Cross bay on the W. coast has been supposed to be the entrance to a strait between a middle island and the northern portion of Nova Zembla; but the latest explorations indicate that this supposition is incorrect, and it is probable that there are but two large islands separated by Matotchkin strait, the northern being about twice as long as the southern island. The geological formation of Nova Zembla is a continuation of the Ural system. The rugged western coast is deeply indented by the sea, and is bordered throughout its extent by mountains which attain an elevation of from 1,000 to 2,000 ft. Several loftier peaks are known, two of which in the vicinity of Matotchkin strait are respectively 3,400 and 3,700 ft. high. In the north the heights do not approach the shore so closely; the E. coast, although lower, is also fringed by highlands. The soil is barren, the only vegetation being mosses and lichens, and in some places a few stunted shrubs. The polar bear, reindeer, walrus, and fox are the animals most frequently met with. The mean summer temperature at the S. extremity is 35° – 51° , and that of winter 3° – 21° . It has been observed that a comparatively mild temperature prevails in the vicinity of the Gulf Stream islands, a barren group on the N. W. coast, occupying a locality which, as is inferred from accounts left by Barentz, was covered by 18 fathoms of water in 1596. Their name is due to the supposition that they lie within the path of the warm current which skirts the Norwegian coast. The islands have no permanent inhabitants, but are visited by fishermen and hunters from the mainland.—Nova Zembla was unknown to the navigators of western Europe prior to the voyage, in 1556, of Stephen Burrough, subsequently chief pilot of England, by whom the entrance to the sea of Kara was discovered. In 1596–'7 the Dutch navigator Willem Barentz, with 16 men, wintered in a hut at Ice Haven on the N. E. coast. Although the coasts of Nova Zembla have been explored by several Russian expeditions during the present century, its N. E. extremity was

never rounded again from the time of Barentz till 1871, when Elling Carlsen, a Norwegian sloop captain, succeeded in reaching Ice Haven, where he found the house formerly occupied by Barentz still standing, and obtained from it many interesting relics in a remarkably good state of preservation. Carlsen's voyage led also to the discovery that the position of the N. E. extremity of Nova Zembla had been erroneously laid down as in lon. $73^{\circ} E.$, the actual longitude being $67^{\circ} 30' E.$

NOVELLO. **I.** Vincent, an English organist and composer, of Italian descent, born in London, Sept. 6, 1781, died in Nice in September, 1861. At the age of 16 he became organist of the Portuguese chapel in London, and under his direction the music there became noted for its excellence. He was one of the original founders of the philharmonic society and a member of the royal society of musicians. He composed largely, but without inspiration. His principal claim to distinction rests on the service he rendered to the art of music by editing and bringing to public attention a vast number of classical works of old as well as modern masters. **II.** Clara Anastasia, an English soprano singer, daughter of the preceding, born in London, June 15, 1818. She studied under Choron in Paris, and Moscheles and Costa in London. Her début as a vocalist was made in 1830 at a benefit concert in Windsor, but she continued to study for the stage, and finally appeared in opera in 1841 in Milan, Bologna, and other Italian cities. In 1843 she appeared at Drury Lane in Pacini's "Sappho." Her artistic career, in which she had already attained a highly honorable position, was brought substantially to a close by her marriage in November, 1843, to Count Gigliucci of Fermo, Italy, though she subsequently appeared at times in public. She took formal leave of her profession at the crystal palace in Handel's "Messiah," and gave her last concert at St. James's hall, Nov. 26, 1860.

NOVELS (*Novellæ Constitutiones*). See CIVIL LAW, vol. iv., p. 622.

NOVEMBER (Lat. *novem*, nine), the 11th month of our year, and the 9th of the Roman when their calendar was first founded. It was one of the 10 months of the year of Romulus, and consisted originally of 30 days, which number was afterward changed to 29, probably by the decemvirs. Julius Cæsar again made it 30 days, and so it has remained.

NOVGOROD. **I.** A N. W. government of European Russia, bordering on Olonetz, Vologda, Yaroslav, Tver, Pskov, and St. Petersburg; area, 46,312 sq. m.; pop. in 1867, 1,016,414. The principal rivers are the Msta, which enters the government from Tver, flows N. W. and S. W., and falls into Lake Ilmen; the Lovat and Polist, which fall into the same lake; the Volkhov, flowing from that lake into Lake Ladoga; and the Sheksna and Mologa, tributaries of the Volga. There are three large lakes: the Bielo Ozero (white lake) in the northeast, about 25 m. long and 20 m. broad; Lake Ilmen in the

southwest, about 30 m. long and 16 m. broad; and Lake Voshe in the northeast, about 15 m. long and 10 m. broad. In the southwest the Valdai hills enter from the province of Pskov, and stretch N. E. They are a limestone range, nowhere more than 1,200 ft. high. The surface of Novgorod is covered with granite boulders, though there is no granite *in situ* within the province, nor in any of those adjoining. The country is in general flat, a considerable portion being covered with lakes and marshes. The soil of the N. portion is for the most part swampy and of a poor quality, but in the south it is good and productive. The climate is cold, and the winter lasts from November to May. There are large forests of pine, fir, beech, birch,

lars. The town is generally ill built. It contains a large number of churches, including the cathedral of St. Sophia in the Kremlin, built after the model of St. Sophia in Constantinople, and several monasteries. The manufactures consist of sail cloth, leather, tobacco, candles, and vinegar. There is a trade in flax, corn, and hemp, carried on chiefly with St. Petersburg.—Novgorod was founded about 500 by the Slavs. About 862 Rurik here laid the foundation of the Russian monarchy, the 1000th anniversary of which was celebrated in 1862, and a magnificent monument was erected in commemoration of it. The seat of government was afterward removed to Kiev, and in the 12th century Novgorod became an independent republic under a hereditary magistrate of limited power. Its territory extended as far as Siberia on the east and Livonia on the west. It had an extensive trade; one of the earliest factories of the Hanseatic league was established at Novgorod, and its fairs were resorted to by traders from all the neighboring countries. In the 15th century the population was 400,000; but in 1477 its independence and prosperity were destroyed by Ivan III.

NOVI, a town of Italy, in the province of Alessandria, 24 m. N. by W. of Genoa; pop. about 12,000. It is walled, and has broad though irregular streets, and a handsome square, with a fountain. There are many fine villas and palaces belonging to opulent Genoese families, who spend the autumn here on account of the salubrious climate. It is famous for its silk manufactures. A battle was fought here, Aug. 15, 1799, between the Russians and Austrians under Suvaroff and the French under Joubert, in which the French were defeated and their commander killed.

NOVIBAZAR, or **Yenibazar**, a town of Bosnia, on the S. border of Servia, 120 m. S. E. of Bosna-Serai; pop. about 15,000. The houses are hardly more than hovels, and the ancient castle is dilapidated; but the town is important on account of its central situation, and for the fertility of the surrounding country. It has annual fairs, which are largely attended, and is the prospective terminus of an important railway line.

NOVICE, a candidate for admission into a religious order who has not yet taken the vows, but is passing through a period of probation. Novices must have attained the age of puberty, else the vows taken by them afterward are invalid. No married person can be admitted except by the consent of both parties. Children whose labor is necessary for the support of their parents are inadmissible, as well as widows and widowers whose children are dependent on them. They usually wear the dress of the order, with perhaps some distinguishing mark, as in certain of the sisterhoods, in which their veils are white instead of black, and are subject to the rules and the authority of the superiors. They are placed under the direction of an officer of the convent, called the



Millennial Monument.

alder, and elm. The principal crops are rye, barley, oats, flax, and hemp. The forests afford shelter to large numbers of wild animals, and the lakes and rivers are well stocked with fish. Iron, coal, and salt are found; and limestone, sandstone, and gypsum are very abundant.

II. A town, also known as Novgorod Veliki (Great), capital of the government, on the Volkhov, near the point where it issues from Lake Ilmen, 103 m. S. S. E. of St. Petersburg; pop. in 1867, 16,722. It is divided into two parts by the Volkhov, which is crossed by a fine wooden bridge supported on granite pil-

master or mistress of novices, whose duty it is to examine their characters and fitness for the religious state, and to try their strength by exposing them to the most serious obstacles to perseverance which they are likely to encounter in the order. The period of probation, called the novitiate or noviceship, must be, according to the council of Trent, at least a year. The reformatory regulations published by Pius IX. make a novitiate of two years obligatory in almost all religious orders. The council of Trent, session 25, canon 17, prescribed that female novices after the expiration of their novitiate should return to their home in the world, and be carefully examined by the bishop of the diocese, to ascertain whether they are under constraint or deception, that they are fully aware of the duties and privations of monastic life, and that they enter it with freedom.

NOVIKOFF, Nikolai Ivanovitch, a Russian author, born at Tikhvensk, near Moscow, in 1744, died there, Aug. 11, 1818. He early published "The Painter," on the plan of the "Spectator," which acquired popularity, and, in conjunction with his biographical work on Russian authors (St. Petersburg, 1772), attracted the notice of Catharine II., with whose consent he established a typographical society at Moscow for the circulation of cheap books and the first circulating library in Russia; but he was obliged to leave Moscow on account of his alleged partiality in his publications for the writings of French philosophers and revolutionists. After the death of the empress in 1796, he received permission to return. Among his works is a collection of historical documents and material, entitled "The Old Russian Library" (10 vols., St. Petersburg, 1773-5).

NOVOGEORGIEVSK, formerly MODLIN, a town of Poland, in the government and 19 m. N. W. of the city of Warsaw, at the confluence of the Bug with the Vistula; pop. in 1867, 9,886. It is strongly fortified, and contains a citadel and an arsenal. The town was founded by Napoleon in 1809, under the name of Modlin. The present name was adopted by the Russian government after its occupation of the town in 1831. It held out against the Russians from January to November, 1813, when it surrendered to avoid starvation. The revolted Poles gained possession of it in December, 1830, and retained it till after the fall of Warsaw in September, 1831.

NOWELL, Alexander, an English clergyman, born at Readhall, Lancashire, in 1507, died in Oxford in 1602. He was educated at Oxford, was admitted fellow of Brasenose college in 1540, and three years later was appointed second master of Westminster school. He took orders in 1550, and became prebendary of Westminster in 1551. On the accession of Queen Mary he went to the continent to escape persecution, and in 1554 was at Strasburg with Jewel, Grindal, and others. In the disputes among the exiles Nowell took moderate

ground and favored mutual concessions. Returning home, he became dean of St. Paul's in 1560. He was chosen prolocutor of the lower house in 1563, became canon of Windsor in 1594, and principal of Brasenose college in 1595. He published Jewel's "Apology" (1566); but his principal work is his "Catechism" in Latin, *Catechismus, sive prima Institutio Disciplinæ Pietatis Christianæ, Latine explicata* (1570). It was translated into English, and into Greek by W. Whitaker. An abridgment (*Catechismus Parvus*) was made nearly at the same time, and also translated into English.

NOX (Gr. Νύξ), in classical mythology, the goddess of night, the daughter of Chaos and sister of Erebus (Darkness), and, according to the Hesiodic theogony, one of the very first created beings. By her brother Erebus she became the mother of Æther (the Air) and Hemera (Day), and she is said to have given birth without any husband to Thanatos (Death), Dreams, Momus, the Hesperides, Nemesis, and similar beings. In later poets she is merely the personification of the darkness of night. She is represented as a winged goddess, covered with a dark, star-spangled robe, or sometimes riding in a chariot accompanied by the stars, and holding in her arms the gods of sleep and death as two boys.

NOXUBEE, an E. county of Mississippi, bordering on Alabama, and intersected by Noxubee river; area, about 700 sq. m.; pop. in 1870, 20,905, of whom 15,798 were colored. It has a nearly level surface and an excellent soil. The Mobile and Ohio railroad passes through Macon. The chief productions in 1870 were 3,619 bushels of wheat, 516,155 of Indian corn, 19,707 of oats, 30,835 of sweet potatoes, 15,473 bales of cotton, 69,044 lbs. of butter, and 25,000 gallons of molasses. There were 1,511 horses, 3,308 mules and asses, 3,131 milch cows, 6,064 other cattle, 2,570 sheep, and 19,196 swine; 1 cotton factory, 10 flour mills, and 3 saw mills. Capital, Macon.

NOYES, George Rapall, an American clergyman, born in Newburyport, Mass., March 6, 1798, died in Cambridge, June 3, 1868. He graduated at Harvard college in 1818, studied theology at the divinity school in Cambridge, was licensed to preach in 1822, and was ordained pastor of a church at Brookfield, Mass., in 1827, and afterward of a church at Petersham. In 1839 he received from Harvard college the degree of D. D., and in 1840 was chosen Hancock professor of Hebrew and other oriental languages, and Dexter lecturer on Biblical literature. His works, chiefly in the department of Hebrew philology, included new translations of the book of Job (1827), the Psalms, the Prophets (3d ed., 2 vols., 1866), Proverbs, Ecclesiastes, and Canticles (1846), and a new translation of the New Testament published after his death (1869).

NOYES, John Humphrey, an American perfectionist, born in Brattleboro, Vt., Sept. 3, 1811.

He graduated at Dartmouth college in 1830, and began to study law; but his attention being turned to religion, he studied theology at Andover and New Haven, and was licensed to preach in 1833. In 1834 he experienced what he called a "second conversion," and announced himself a "Perfectionist." His license to preach was annulled, and he began to teach his new faith in various periodical publications, which have become merged in the "Oneida Circular." He has also published a number of volumes, of which "The Berean," "The Second Coming of Christ," "Salvation from Sin," "Bible Communism," "Male Continence and Scientific Propagation," and a "History of American Socialisms," are the most important. By the phrase "salvation from sin" he and his followers understand a special phase of religious experience, having for its basis spiritual intercourse with God, which may proceed so far, even in this life, as to destroy selfishness, and so make an end of sin. He holds that while a community such as those he has founded may contain members who have not reached this state, without a working majority of persons who have this religion, communism such as he has attempted is impossible. The practical application of his doctrines has been made in the two communistic societies at Oneida, N. Y., and Wallingford, Conn., which in 1874 numbered 283 members (238 at Oneida and 45 at Wallingford). They practise community of women as well as of goods, maintain the equality of women with men in social and business life, live in a "unitary home," are engaged in various manufactures, and in 1874 owned property to the amount of half a million of dollars. They are thorough farmers, have two well fitted printing offices, and employ many persons who are not members.

NOYON (anc. *Noviomagus*), a town of France, in the department of Oise, 55 m. N. E. of Paris; pop. in 1866, 6,498. It is a place of great antiquity, and was the birthplace of Calvin. The cathedral of Notre Dame, built by Pepin the Short, enlarged by Charlemagne, and, after having been damaged by fire, rebuilt in the 12th century, is one of the best specimens of transition architecture in France. There are several other fine public buildings, among which are the town hall, the ancient episcopal palace, and the hospital. There are manufactures of cloth, laces, and hosiery. Charlemagne was here crowned in 768, and Hugh Capet was here chosen king in 987. The place subsequently passed through many vicissitudes. In 1516 a treaty was concluded here by Charles V. and Francis I.—About 4 m. E. of Noyon is the village of Salency, with a palace and an ancient church. It is the birthplace of St. Médard, who instituted here a "festival of roses," which is still celebrated by crowning the most virtuous maiden of the village, and presenting her with a sum of money.

NUBIA, a country of Africa and dependency of Egypt, comprehending in its widest sense

all that territory which is bounded N. by Upper Egypt, E. by the Red sea, S. E. and S. by Abyssinia and the Dinka country, and W. by the Sahara and a narrow slip of the desert which separates it from Darfour. It thus extends between lat. 10° and 24° N., and lon. 28° and 39° E., about 950 m. in length, and rather more than 600 in breadth; and includes Lower Nubia, or Nubia proper, from the limits of Egypt to the S. boundary of the province of Dongola; the ancient kingdom of Merœ, on the E. bank of the Nile between the Atbara and the Bahr el-Azrek or Blue river; and Sennaar, in the extreme south. The territory of Kordofan on the left bank of the Nile, W. of Sennaar, is usually regarded by geographers as a part of Nubia. The application of the name Nubia is very indefinite, however, being restricted by some authorities to the territory E. of the Nile, while the small tract between Derr and Dongola, called Nooba or Wady Nooba, is the only locality to which the natives now apply the word. Lower Nubia consists chiefly of deserts, extending on the east to the Red sea, the coast of which is here bordered by a range of hills, and on the west nearly to the Sahara. Of these, the largest is the great Nubian desert, which is crossed by caravans from Korosko, near Derr, to Abu Hammed, a route of 230 m., which has been described as the chord of the arc made by the great western bend of the Nile. The monotonous scenery of this burning and waterless waste of sand is varied by mounds of volcanic slag and hills of black basalt. The Nile itself is here enclosed by mountain ranges of sandstone and granite, which approach close to the banks of the river, leaving only a narrow strip of land along the water's edge. The northern portion of Upper Nubia, W. of the Nile, is occupied by the Bahiuda desert; further E. in the river valley is Berber; and above the mouth of the Atbara, the Merœ of antiquity is represented by the town and district of Shendy. Beyond Khartoom, the Nubian territory embraces Kordofan on the west and Sennaar on the east, the latter extending to the 10th parallel of N. latitude. Upper Nubia is a well watered table land of moderate elevation, diversified by low mountain ranges, but largely consisting of vast and fertile though neglected plains, some portions of which are artificially irrigated by means of the oriental water wheel. The chief geological formations are granite, quartz, and mica slate.—The climate of Nubia is dry in the north, comparatively moist in the south, and very hot throughout the whole country, but not unhealthy. In Lower Nubia the annual rainfall is exceedingly light, but further up the Nile there are plentiful showers during the spring months. In May the temperature of the air on the Nubian desert frequently ranges from 108° to 114° F. in the shade, and at night the mercury not uncommonly falls more than 30 degrees. The cool season extends from November to February. The doum palm is one

of the most important vegetable products of the country, forming as it does a source of food for the desert tribes of Arabs, who seek its fruit in the vicinity of the rivers during seasons of drought and scarcity. The grain most commonly cultivated in Nubia is durra (*sorghum andropogon*), of which there are many varieties. It is planted in July and harvested in February or March. The stalk attains a height of 7 and even 10 ft., and the kernels are about as large as hemp seed. The durra flour is made into unleavened bread. Barley, beans, lentils, melons, pumpkins, and tobacco are also grown. The soil in many districts is peculiarly adapted to the cultivation of cotton, but the prevalence of official extortion exerts a depressing effect upon the agricultural development of the country. The domestic animals of the Nubians are cattle, sheep, goats, dogs, and the common fowl. They possess a few camels, and in Dongola there is a fine breed of horses. Hippopotami and crocodiles frequent the rivers, in the neighborhood of which are also found hyænas and herds of giraffes. Gazelles are met with in the desert and among the eastern mountains, and baboons descend from Abyssinia into Nubian territory. Fish and turtles are obtained from the Nile tributaries by the natives. The manufactures of Nubia are limited to the weaving of coarse cotton and woollen cloths, and the construction of various articles of household use from the leaves of the date tree. The exports comprise grain, honey, musk, ebony, leeches, and ivory. The inhabitants of Nubia are a handsome mulatto race of dark brown complexion, bold, frank, cheerful, and morally much superior to the Egyptians. They live in low huts built of mud or loose stones, roofed with durra straw; in the larger towns and villages, however, many of the houses are better built. The largest Arab tribe of the country, the Bishareen Arabs, dwell in Lower Nubia, in the region of the Atbara. The extensive monumental ruins that stand along the banks of the Nile constitute one of the most remarkable features of Nubian scenery. (See NILE.)—The name Nubia is supposed to have originated in Egypt, where the word *nob* or *nub*, signifying gold, was applied to those countries whence the precious metal was brought. In the early Greek and Roman writers there is occasional mention of Nubia, but no particular information concerning it. In the reign of Diocletian, however, a tribe known as the Nubæ or Nubatæ inhabited the region adjoining Egypt on the south, and were granted a considerable area of territory near the first cataract of the Nile, upon their engagement to protect that country, then a Roman province, from invasion by the Ethiopians. These people reappear in history under the name of Noobas, at the time of the Moslem invasion of Egypt in the 7th century, when they constituted a powerful Christian nation whose capital was at Dongola. They remained tributary

to the Mohammedan conquerors of Egypt, though frequently revolting and as often subdued, until the 14th century, when the power of the king of Dongola, who with all his ostensible allegiance to Egypt had been virtually independent, seems to have been overthrown. Christianity was extinguished by repeated Arab invasions, and the country became divided into a number of small Mohammedan states governed by independent chiefs. Among these were Dongola, Berber, and Shendy. In 1821 Mehemet Ali, the pasha of Egypt, sent an expedition against Nubia, overcame the principal states, and finally extended his conquests as far as the frontiers of Abyssinia. Ever since that period the country has remained in subjection to the Egyptian rulers. Sir Samuel Baker and the German traveller Schweinfurth represent the present conditions of Nubia as unfavorable to prosperity. Of late years taxation has increased while production has diminished, and the consequent scarcity and distress have led to the emigration of large numbers of the inhabitants.

NUBLE, an inland province of Chili, bordering on the provinces of Maule and Concepcion, and separated from the Argentine Republic by the Andes; area, 3,700 sq. m.; pop. in 1872, 128,182. It occupies the central plain and the western slopes of the Cordillera, forest-clothed branches from which intersect the province, dividing it into pleasant and fertile valleys. It is watered by affluents of the river Itata, one of which is the Nuble, flowing near the capital. The products embrace all the cereals, and a great variety of fruits and vegetables; cattle and horses are reared in large numbers; and several kinds of excellent wine are made. The province comprises the two departments of Chillan and San Carlos, which before 1848 belonged respectively to the provinces of Concepcion and Maule. Capital, Chillan.

NUCKOLLS, a S. county of Nebraska, bordering on Kansas, and intersected by the Republican and Little Blue rivers; area, 576 sq. m.; pop. in 1870, 8. The surface consists mostly of undulating and fertile prairies.

NUCLEOBRANCHIATES, an order of gasteropod mollusks, so named by De Blainville because the respiratory and digestive organs form a kind of nucleus on the posterior part of the



Carinaria.—*p*, proboscis; *t*, tentacles; *b*, branchiæ; *s*, shell; *f*, foot; *d*, disk.

back; they have been called by subsequent writers *heteropoda*, the foot being divided into

a ventral fin, sucker, and terminal fin. Though they are regarded as the most highly organized of the gasteropods, their form and mode of progression are very different from the type of their class. They are rapid swimmers, found at the surface in mid ocean, moving by their fin-shaped foot and tail, and attaching themselves to seaweed by the sucker. The abdominal portion is small, the anterior parts being greatly developed; the proboscis is large and cylindrical, and the tongue armed with spines; from their transparency, the irregular circulation can be plainly seen. Some have no special breathing organs; the sexes are separate; the nervous centres are widely separated; the eyes and auditory vesicles are well developed. In the *firolidæ* the body is large and the shell small or absent; in the *atlantidæ*, the animal can retire within the shell. In *carinaria*, a good specimen of the group, the gills and heart are protected by a small shell; it swims, back downward, by means of its vertically flattened ventral fin; it feeds on minute pteropods and jelly fishes. Many species are found fossil, and the *Maclurea*, one of the oldest and largest of the Silurian forms, belongs in this order.

NUDIBRANCHIATES. See MOLLUSCA.

NUECES, a S. county of Texas, bordering on the gulf of Mexico, and bounded N. by the Nueces river; area, 3,450 sq. m.; pop. in 1870, 3,975, of whom 332 were colored. Between the mainland and the Isla del Padre, a narrow strip of land extending along the coast, is the Laguna del Madre. Corpus Christi bay is on the N. E. corner, and the county is indented by other bays and lagoons. These waters furnish excellent fish and oysters in abundance. It has an undulating but nearly level surface, and the soil is a rich sandy loam, and very fertile. The seasons, however, are too dry for agriculture. The county is well adapted to the raising of sheep. In 1870 it produced 3,600 bushels of Indian corn, and 199,650 lbs. of wool, and contained 18,304 horses, 675 mules and asses, 1,911 milch cows, 177,270 other cattle, 82,368 sheep, and 1,783 swine. Capital, Corpus Christi.

NUEVA GUATEMALA. See GUATEMALA.

NUEVA SPARTA, or *Margarita*, an island in the Caribbean sea, off the coast of Venezuela, of which it is a province; length about 45 m., breadth from 5 to 20 m.; area, 441 sq. m.; pop. about 21,000. It consists of two portions, connected with each other by a low and narrow isthmus. The surface is rocky and mountainous, especially toward the west, where it attains an elevation of 3,000 ft. above the sea. The coast is rugged and precipitous, but is indented with excellent harbors, the chief of which, Pampatar, on the S. E. coast, is a spacious basin, deep and well sheltered. The interior is fertile, producing maize, bananas, sugar, coffee, and cacao. It was formerly celebrated for its pearl fishery; but the pearls are now less abundant, smaller, and of inferior quality. It was discovered by Columbus in

1498, and in 1816 was the scene of a sanguinary struggle between the patriots and the Spanish troops, which resulted in the defeat of the latter. Capital, Asuncion.

NUEVO LEON, an inland state of Mexico, bordering on Coahuila, Tamaulipas, and San Luis Potosí; area, 14,363 sq. m.; pop. in 1869, 174,000, but reported by the governor in 1872 at 178,871. The surface is very irregular, being traversed by several branches of the Sierra Madre; and about one fourth belongs to the great central table land of Mexico. Extensive valleys, divided between forest, pasture land, and cultivated fields, lie between the mountains, and are intersected by numerous rivers. Most of these have precipitous courses, and none are navigable. Among the more considerable are the Salado, separating the state from Coahuila, the Sabinas, Salinas, Santa Catalina, San Juan, Ramos, Pilon, Linares, and Blanco; besides which there are numberless mountain torrents, and several small lakes. The mineral productions comprise gold, silver, copper, lead, iron, and cinabar; sulphur, nitrate of potash, several varieties of sulphate of lime, alabaster, and marble are found; and salt is very abundant, but not yet worked to much extent. Sulphur and thermal springs are common, particularly in the vicinity of Monterey and Morelos. The climate is hot, humid, and insalubrious in the lowlands and some of the valleys, where malignant and intermittent fevers prevail; temperate in the elevated regions; and varied in the hill country of the centre. The soil is in general fertile, but suffers from want of irrigation. The principal productions are maize, usually yielding three crops annually, and the sugar cane, with some beans (*frijoles*), and a little wheat and barley. Mining is carried on to a limited extent; and cotton cloths, hats, furniture, leather, and boots and shoes, all of excellent quality, are extensively manufactured. In the weaving establishments, some of which have steam power, about 5,000 workers are employed. The annual value of the sugar manufactured is about \$300,000. Cattle rearing, once an important industry, is comparatively neglected. In 1873 there were in the state 104 public schools, 85 of which were for males, with an attendance of 5,222, and 19 for females, with 1,220 pupils; 106 private schools, 75 being for males and 31 for females, the former with 2,408 pupils, and the latter with 982; and a civil college, a seminary, and a college for females, with 312, 63, and 65 pupils respectively. Nuevo Leon, in colonial times called the kingdom of Nuevo Leon, is divided into nine partidos or districts: Monterey, Cadereita, Villaldama, Salinas, Victoria, Doctor Arroyo, Garcia, Morelos, Cerralvo, and Linares. The capital is Monterey; other chief towns are Cadereita, Linares, and Morelos.

NUISANCE (formerly written *nusance*; law Fr. *nosaunce*, *noysaunce*, from *noier*, modern Fr. *nuire*, to injure; Lat. *nocumentum*, from

noceo, annoyance, anything that works hurt, inconvenience, or damage). Nuisance cannot be well defined in specific terms. Not only are the rights which it affects themselves rather indefinite, but, including as the offence does both private and public injuries, it is applied as well to those immediate wrongs to individuals which can hardly be distinguished from trespass, as to those remote offences against the public order and welfare in which no one member of the community can show greater damage than any other. More than this, the offence of nuisance is rarely direct and aggressive, but the injury in which it consists is rather the consequential than the immediate effect of the wrong act.—A familiar division of nuisances is that into public or common and private. The former, says Blackstone, are those which affect the public and are an annoyance to the king's subjects, for which reason we must refer them to the class of public wrongs. Private nuisance may be defined as anything done to the hurt or annoyance of the lands, tenements, or hereditaments of another, as when one projects the eaves of his own building over the roof of that of his neighbor, or stops his ancient lights; or the nuisance may affect incorporeal hereditaments, as when one ploughs up the road in which I have a right of way across another's land. It will be seen that these illustrations of private nuisance approach very nearly to the offence of trespass. Of the first, indeed, Blackstone expressly says it is a species of trespass, for *cujus est solum, ejus est usque ad celum*, he who possesses the land possesses also that which is above it; and the last is the case of infringement of a right which, though not corporeal, is yet clearly determined. Yet, however much cases like these may resemble trespass and differ from public nuisance, they cannot be ranked with the former, for they lack some of its technical elements, as, for example, the direct application of force, which is the criterion of trespass; and they may be well enough ranked with the latter, because they have so much in common with it. Nuisance, then, whether private or public, is rather a tortious than a criminal act. It is not committed with force, either actual or implied. The injury of it arises rather from misuse of one's own, than from abuse of or aggression on another's right; and it is therefore indirect or remote, as distinguished from actual invasion of another's property. It would be trespass, that is, a plain infringement of another's right, to enter without his permission, express or implied, upon his land or into his house; but it is less clear that an offence has been committed when one complains that his neighbor has injured him by erecting a building so near him as to darken his windows, or by keeping a swine yard so near as to lessen his comfortable enjoyment of life. The nuisance is by so much less clear than the trespass, as the rights which the complainant sets up in the former cases are less nicely marked than those

tangible ones of corporeal property which are invaded by the trespass. So in respect to public nuisance, the offence consists in an encroachment on common rights of the whole society, which, from their nature, are determined with very various degrees of certainty. If one obstructs the public highway, the case is clear; but it is not quite so evident that a bowling alley is a public nuisance, and it may require a legislative act to show that to keep liquors for sale is an offence of the same character. The public wrong differs, too, in different communities. One, for instance, may legally carry on an offensive trade in an uninhabited tract of country, but he is guilty of a public nuisance if he exercises it in the midst of a town. Indeed, when any use even of one's absolute rights diminishes the general welfare, it becomes misuse of them and nuisance. In respect to public nuisance, it is to be further observed, that as the legislature represents the whole society and is the particular custodian of the public welfare, no act which it authorizes can be declared a public nuisance. This has been so held in respect to railways laid in the streets of cities under legislative charters; and in the case of a railroad, the locomotives on which frightened the horses of passengers along a parallel highway, it was declared to be no nuisance, because the public benefit may be supposed to have been regarded by the legislature as sufficient compensation for the inconvenience. Yet any abuse or excess of the privileges thus granted intrudes on the domain of public rights, and is a nuisance to them.—A good criterion of nuisance was suggested by the court in an English case in the following language: "Is the inconvenience one of mere delicacy and fastidiousness, or does it interfere with the ordinary physical comfort of human existence, not merely according to elegant or dainty modes of living, but according to plain, sober, and simple notions?" Public nuisances, says a commentator upon the criminal law (Bishop), may be defined as all those acts put forth by man, which tend to create evil consequences to the community at large, and are of sufficient magnitude to require the interposition of the courts. They are, then, injuries to that aggregate of rights which constitutes the well-being of society. All acts therefore which imperil the public safety or health, or disturb the public convenience, are indictable as common nuisances. Such acts are the keeping of gunpowder in mills or magazines in a dangerous manner, near the dwellings of citizens or near a public highway, or carrying on offensive trades in populous places; and it is not necessary that this affect the health; it is sufficient, said Lord Mansfield, if it lessen the enjoyment of life. So it is an indictable offence to expose a person infected with a contagious disease in a public street. With regard to offensive trades, it was formerly held to be the rule that if one had been for a long time carried on in a locality remote from habitations, those who after-

ward came to dwell in the vicinity had no ground to complain of the nuisance. But late cases hold what seems to be better doctrine, to wit, that no one can have a right to use his own land so as to render that about him in any degree useless. His enjoyment must have reference to the rights of others, and be subordinate to the general laws which have been devised for the common benefit. So it was held in respect to a bathing place in England. When it was urged in defence that it had been, time beyond memory, the resort of bathers, the court said that, the neighborhood having lately become thickly populated, the ancient enjoyment of the beach must cease; for whatever place may become the dwelling of men, there the laws of decency must be observed. All injuries to the highway, as obstructions of it, or narrowing it, which render it less commodious to the public, are nuisances at common law. One has been held to be indictable who, by exhibiting effigies in his window, attracted such crowds to look at them as to hinder free passage along the road. As it disturbs the public order, that is a common nuisance which corrupts the morals of the community. Profane cursing and swearing in public is indictable as a nuisance. So are open lewdness, disorderly inns, and bawdy and gaming houses.—The remedies for nuisances vary with the character of the injury. For a private wrong there is a private remedy by civil suit, and for a public wrong a public remedy by indictment; but never a private action for a public mischief, nor a public prosecution for a private injury. Compensation for a private nuisance is sought therefore by private action; but in the case of a public nuisance, though each member of the society is in fact wronged, yet no one may have a private suit. Thus if A dig a trench across the highway, the act is a public grievance; but no individual can make the offence a cause of action, for no one can ascertain his particular proportion of the damage; and even if he could, it would be highly inexpedient that the offender should be pursued by the separate suits of all the citizens. But if B fall into the trench and sustain particular damage, this will give him cause of separate action, not founded at all upon the nuisance, for that is matter of public concern, but upon the private damage which the public wrong has caused him particularly. In other words, A's tortious act, though immediately a public offence, has yet wrought consequentially the same injury to B which a direct personal trespass would have wrought. For what we may call B's public right of free passage along the highway he has no right of individual action, but must join with the whole body politic in a public prosecution.—He whose rights are prejudiced by a private nuisance may abate it, that is, may remove it by destroying, if need be, the cause of nuisance; and as a public nuisance injures equally all the members of the society, it has been laid down that any one of these has the

right to and may legally abate it. Thus, says a text writer of authority, if any one whose estate is prejudiced by a private nuisance actually erected, may justify the entering into another's ground and pulling down and destroying such nuisance, it cannot but follow *a fortiori* that any one may lawfully destroy a common nuisance. But it is also the law in respect to private nuisance, that one may abate so much and only so much as is a direct injury or nuisance to him individually; and this will appear reasonable when it is remembered that it is just this direct injury which gives and measures the right of private suit. In private nuisance, then, one may abate as he may have his civil action, in both cases for the special injury. Now in respect to public nuisance we have seen that the law permits no individual citizen to prosecute the public wrong, but limits him to a private action for his private damage. By analogy with the case of private nuisance, it would seem that, in respect to public nuisance, the right of individual action should measure the right of individual abatement; that is to say, that an individual would be privileged to abate a public nuisance, not as such and merely because it existed, but only when, and so far as, it interfered with his individual rights; in short, that he might abate in those cases only in which he might have a separate action. This is the doctrine of the recent English and American cases.—The remedies at law can at most only abate or afford compensation for existing nuisances, but are ineffectual to restrain or prevent those which are threatened. There is therefore a jurisdiction in equity over nuisance, by process of injunction; but the jurisdiction will be exercised only when the fact of nuisance is clearly made out, and when it is proved that, from the nature of the case, the injury is not susceptible of adequate compensation at law.

NUITER, the anagram of CHARLES LOUIS ÉTIENNE TRUNET, a French dramatist, born in Paris, April 24, 1828. He became archivist of the opera, and his vaudevilles are very popular, especially *La perruque de mon oncle* (1852), and *Un coup d'éventail* (1869). He has written libretti for *Obéron* and *Préciosa* (1857), *Roméo et Juliette* (1859), *Tannhäuser* (1860), *Macbeth* (1865), *Le docteur Crispin* (1869), *La princesse de Trébizonde* (1869), *Le kobold*, and other operas, chiefly those of Offenbach; and he has prepared several ballets.

NUKAHIVA. See MARQUESAS ISLANDS.

NUKHA, a walled town of Asiatic Russia, in the Transcaucasian government and 60 m. N. E. of the city of Elisabethpol; pop. in 1872, 23,371. It consists of a Tartar and an Armenian town. Inside the fortress is a Greek orthodox church. The W. part of the town forms the settlement of Tzarabad, noted for the production and manufacture of silk, which have been carried on here for several centuries.

NULLIFICATION, the refusal of a state to permit an act of the federal congress to be ex-

cutted within its limits. The Kentucky resolutions of 1798 declared the constitution to be a compact; that "to this compact each state acceded as a state, and is an integral party; that the government created by this compact was not made the exclusive or final judge of the powers delegated to itself, but that, as in all other cases of compact among parties having no common judge, each party has an equal right to judge for itself, as well of infractions as of the mode and measures of redress." To this it was added by the resolutions of 1799 that "a nullification by those sovereignties [the states] of all unauthorized acts done under color of that instrument [the constitution] is the rightful remedy." The election of Mr. Jefferson to the presidency in 1800 took away all occasion for any more distinct assertion of the doctrine at that time; but in the controversy over the tariff near the close of the administration of John Q. Adams, Virginia reasserted the right of each state to construe the federal constitution for itself; and in 1832 South Carolina undertook to give the doctrine practical effect by an ordinance adopted by a delegate convention chosen for the purpose, which declared the tariff acts of congress to be null and void, forbade the collection of duties within the state, required all persons holding office under the state to take an oath to support the ordinance on pain of vacating their offices, pledged the people of the state to maintain the ordinance and not to submit to force, and declared any acts of the general government to enforce the tariff or to coerce the state to be inconsistent with her longer continuance in the Union, and that she would forthwith proceed to organize a separate government. This ordinance was met by a proclamation of President Jackson in which he declared that "the power to annul a law of the United States, assumed by an individual state, is incompatible with the existence of the Union, contradicted expressly by the letter of the constitution, unauthorized by its spirit, inconsistent with every principle on which it was founded, and destructive of the great objects for which it was formed," and pledged himself at all events to execute the laws. This threatening controversy was for the time allayed by the compromise of Mr. Clay; but when dissatisfaction with federal affairs again led to its practical assertion, the states did not stop at the nullification of particular laws, but proceeded at once to declare their relations with the Union at an end. (See CALHOUN, JOHN C.; CLAY, HENRY; HAYNE, ROBERT Y.; JACKSON, ANDREW; and WEBSTER, DANIEL. See also CONFEDERATE STATES.)

NUMANTIA, an ancient city of Spain, capital of the Arevaci, supposed to have been in Hispania Tarraconensis, on the present site of Puente de Don Guarray, on the Douro, 3 m. N. of Soria, Old Castile. It was the most important place in all Celtiberia. After the fall of Carthage (146 B. C.), the Numantines re-

solved not to surrender to the Romans, and defeated in succession (140-137) Quintus Pompeius, Popilius, Mancinus, and Lepidus, who were sent against them. Finally, Scipio Africanus the younger besieged them with 60,000 men. The Numantines, who numbered no more than 4,000 men able to bear arms, held out for 14 months, when, their provisions being exhausted and their sources of supply cut off, they set fire to their houses and killed their wives, their children, and themselves (133 B. C.).

NUMA POMPILIUS, an ante-historical king of Rome. After the death of Romulus there was an interregnum of a year, each of the senators in turn enjoying the regal prerogative; but the people soon demanded the election of a king. When the senate had given its consent, a dispute arose between the Sabines and Romans as to which people the sovereign should be taken from; and when it was agreed that he should be selected from among the Sabines, Numa Pompilius, of the town of Cures, was unanimously chosen. His first care was the reformation of the civil institutions. He divided the lands which Romulus had gained by conquest, founded the worship of Terminus, the god of boundaries, and divided the artisans according to their trades into nine companies. He was considered the author of the Roman ceremonial law. He regulated the duties of the pontiffs, who had charge of the enforcement of the laws relating to religion, the augurs, the flamens, the vestal virgins, and the Salii, and prescribed the rites of worship. He reigned 39 years, and in all that time, as Livy relates, there were no wars, famines, or plagues. He was buried under the Janiculum hill. At his death the nymph Egeria, who had been his guide and counsellor through life, melted away in tears, and was changed into a fountain. According to popular tradition he derived much of his knowledge from Pythagoras, which critics regard as an anachronism. The sacred books of Numa were said to have been buried near him, and to have been discovered 500 years afterward (181 B. C.).

NUMBERS, one of the canonical books of the Old Testament, and the fourth of the five books of Moses. It is called in the Hebrew canon *Bemidbar*, "in the desert," from a leading word in the first verse of the opening chapter, and describes the numbering of the children of Israel, the continuation of the laws given to Moses in the wilderness of Sinai, the march through the wilderness, the rejection of a whole generation, and the entrance into the land of Canaan. Historically it comprehends a period of 38 years, opening with the second month of the second year after the exodus; but it is chiefly confined to the first and last of these years. For all questions relating to the authorship and authenticity of the book, see **PENTATEUCH**.

NUMIDIA, an ancient country of northern Africa, corresponding nearly to the modern Algeria. In early times the country was oc-

cupied by tribes from whose nomadic mode of life it is supposed to have received its name (Gr. *Νομαδία*, or *ἡ Νομαδική*). Among the principal towns were: Hippo Regius (now Bona), the capital of the Massylians; Cirta (Constantine), the residence of Masinissa; Zama, famous for the final defeat of Hannibal in 202 B. C.; Cæsarea (Cherchell), which at a later period gave name to Mauritania Cæsariensis; and Siga, the capital of Syphax. The Numidians were famous as horsemen. When the Romans, during the second Punic war, first entered into relations with the Numidians, the Massylians were the principal tribe E. of the Ampsaga (now Wad el-Kebir), and the Massæsylians W. of it. Masinissa, the son of Gala, a king of the former, having allied himself with the Romans, after various struggles became master also of the possessions of Syphax, the rival king of the Massæsylians, and in a long reign made the united kingdom powerful and prosperous. Of his three sons, who according to his will divided the country after his death (148 B. C.), Mastanabal and Gulussa died soon after, and the kingdom was reunited by Micipsa, who died in 118, bequeathing his possessions to his sons Adherbal and Hiempsal, and to his nephew Jugurtha. The first two soon fell victims to the treachery of Jugurtha, who himself ended his life in a dungeon at Rome (104). Numidia was bestowed by the conquerors on Hiempsal II., a prince of royal blood, whose son and successor Juba, having fought with the adherents of Pompey against Cæsar, shared in their defeat at Thapsus (46), and died by his own hand. Numidia was made a Roman province, and its western part was annexed to Mauritania. Augustus restored Juba II. to his father's kingdom, but subsequently made him king of Mauritania and the land between the Malva and Saldæ, converting the territory between the latter river and the Tusca into a Roman province. Another part between the Saldæ and the Ampsaga being annexed to Mauritania under Claudius, the eastern division, also called New Numidia or Numidia Proper, formed a province of the later empire.

NUMISMATICS (Lat. *numisma*, a coin), the science of coins and medals. It has no relation to the value of coins as a circulating medium, but only to the history of coins and medals in all ages and countries, and the study of history as illustrated by their images and superscriptions.—A coin is a piece of metal bearing an impressed device, and designed for circulation as money. A medal is a large piece of metal struck with one or more dies, intended to commemorate some event, and not designed for circulation. A medallion is now generally understood to be synonymous with a medal. A medallet is a small medal, and usually but not necessarily of inferior workmanship. A token is a small medal, usually but not always of the same size with the current coin of the country in which it is struck, and

issued for purposes of private individuals. The obverse of a coin or other piece is that side which bears the portrait or principal design indicating the country, nation, or object for which it was struck. The other side is the reverse. The head or portrait on a piece is said to face to the right or left with reference to the beholder's right or left hand. When the design on a specimen varies in any decided characteristic from one already known, while the general object and purpose is manifestly the same, this is said to constitute a new type. When the variation is very slight, as in the size of the lettering or the distance between letters, it is classed as a variety. Proofs are coins or medals struck from the original die as it leaves the hands of the die cutter, and are thus distinguished from specimens struck with dies which have been reproduced by pressure from the original dies. Pattern or mint pieces are coins struck in any mint and proposed for adoption in the coinage of a country, but not adopted in the year of their first manufacture. The abbreviations AU. or AV., AR., and Æ. signify respectively *aurum*, gold, *argentum*, silver, and *æs*, brass or copper. Electrum, a native alloy of silver and gold, was also used in ancient times for coins. The term billon denotes a debased silver used in some coinage. Brass was used for coin in ancient times, and is frequently used in modern times for tokens and medallets. Potin is a softer alloy than billon. The field on a coin or medal is the open space not occupied by a device or inscription. The exergue is variously understood as the open space outside the figure and inscriptions, or as the portion of that space below the main device, and distinctly separated from it. Strictly, the exergue only belongs to the reverse of a coin, but in America this distinction is not preserved. The legend is usually understood to be any inscription other than the name of the monarch or personage represented on the coin or medal. The inscription includes any legend, names, titles, &c. A mint mark on a coin is the private mark placed on it by the mint to indicate genuineness, or the place of coinage, or for some other purpose. The size of coins or medals is measured among numismatists by arbitrary scales. In Europe Mionnet's scale is generally used. In America a scale of sixteenths of an inch is much in use, and a medal of size 24 is 24 sixteenths of an inch in diameter across its face.—Most of the principal cities of Europe have valuable numismatic collections, the most important of which are those of Paris, London, St. Petersburg, Berlin, Munich, Vienna, Copenhagen, Stockholm, Florence, and Madrid. The oldest coin extant is considered by high authority to be a specimen of the gold stater of the Ionian city of Miletus, now in the British museum, of about 800 B. C. It has a lion's head on the obverse, and a rude indented punch mark on the reverse. But Herodotus says that the Lydians were the first to coin gold, and by some authorities the gold

coins found in the ruins of Sardis are believed to antedate the Ionian specimen. The most ancient type represents the mythical triumph

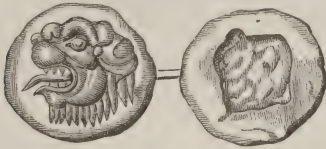


FIG. 1.—Gold Stater of Miletus.

of the lion over the bull, typical of the triumph of royal authority over its enemies. The Per-



FIG. 2.—Gold Stater of Sardis.

sian stater or daric was also coined at a very early period. It bore the royal emblem, a



FIG. 3.—Persian Gold Daric.

regular punch marks on the back; in the second period the punch holes are more regular, and in the third the tortoise is more elaborate and the punch holes have a decided tendency toward symmetry. A marked feature in the history of coinage is the passage

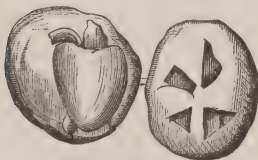


FIG. 4.—Silver Coin of Ægina, First Period.

through the successive stages of improvement in the punch holes on the reverse. The first

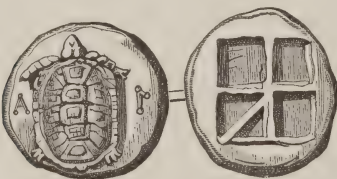


FIG. 5.—Silver Coin of Ægina, Third Period.

improvement was to give the end of the punch some rude design, as in the coin of the Corinthian colony of Syracuse, fig. 6. The next advance was to make the punch correspond to the die, which produced a coin with a design in relief on one side and an incused impression of the same design on

the other. The coins of Tarentum in Magna Græcia are fine examples of this class, some of which are as early as 600 B. C. Sometimes



FIG. 6.—Coin of Syracuse.

the incused reverse differs in design from the obverse. Coins with both obverse and re-



FIG. 7.—Incused Coin of Tarentum.

verse in relief were made in Magna Græcia about 510 B. C., and this form came into general use previous to 400 B. C. One of the oldest known coins bearing the name of a sovereign is inscribed ΑΑΕΞΑΝΔΡΟ, the name of Alexander I. of Macedon, who reigned from about 500 to 454 B. C. Coins of Getas, king of the Edoneans, bear in addition to the name the title of king and the name of the people. The first devices on coins were generally the forms of animals, local genii, river gods, nymphs, and the like. Portraits do not appear until the time of Archelaus I. of Macedon (413-399 B. C.); but some doubt that the face on his coins is a portrait, and contend that no human head was impressed on a coin until after the death of Alexander the Great, whose head was then admitted as in some sort that of a divinity. To the Greeks belongs the credit of bringing the art of coining to perfection; and although modern art has invented new processes which secure greater uniformity, the most elaborate coins of the present day do not surpass those of the Macedonian empire in boldness and beauty of design. The spread of the art was very rapid. There was scarcely a colony of Greece, and certainly no independent nation, which did not have its coinage. More than 1,000 series of Greek autonomous coins, or coins of self-governing cities, are extant. There are also the splendid series of the Parthian kings, the Macedonian, Armenian, Bactrian, Syrian, Thracian, Bithynian, Cappadocian, Carian, the Ptolemaic series of Egypt, and numerous others, all including large varieties extending through many years, sometimes through centuries, and all

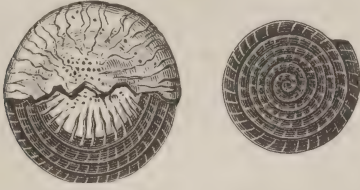
distinct from those of the Roman empire and its dependencies. For a long time before the establishment of the empire, and even after its beginning, family names and devices were used on the coins of the various parts of the Roman dominions. These family coins, which are sometimes called consular coins, because the names of most of the consuls appear on them, constitute a very large and important series, containing the names of a great number of the Roman families, both patrician and plebeian. The imperial coinage is also a superb series, in which are preserved the portraits of the emperors, and many interesting and valuable records. Numismatists are accustomed to class the gold, silver, and copper or brass coinage distinctly, dividing the latter into first, second, and third classes, according to size. Another series is that called the imperial Greek, issued by Greek cities subjected to Rome, and which generally bear the portrait of the reigning emperor, with his name and titles in Greek. The Roman colonial coins, the most of which were issued in Spain, also form a distinct class, generally marked by the abbreviation *col.* for *colonia*. In the eastern empire the coinage became very rude, and in mediæval times the art had so declined that the coins of Europe and the East of that period are little better than the earliest form of Ionian coinage.—The Chinese are said to have coined the bronze pieces called *cash*, having a square hole in the centre, about 1120 B. C.; but according to the best authorities there is no certainty of the existence of any genuine specimens older than 247 B. C. The Hindoo or Indian coinage is of early origin, but the date is unsettled. There are square copper coins with a Pali legend, which are conjectured to be of the 3d century B. C., but the earliest certain dates are about 100 B. C. The Hebrews had no coin of their own until the time of the Maccabees, when Simon, by virtue of the permission in the decree of Antiochus (1 Macc. xv. 6), issued the shekel and the half shekel, with such inscriptions as "Shekel Israel," "Jerusalem the Holy," and "Simon prince of Israel." This coinage seems not to have been continued after the time of the Maccabees. These, with some small brass coins of the Herods, Archelaus, and Agrippa, and a doubtful coin attributed to Bar-Cokheba, the leader in the last rising against the Romans, are the only coins of Judea which are extant. The Arabic series of coins begins with the successors of Mohammed in the 7th century. They usually have a sentence from the Koran on the reverse, and the name of the caliph on the obverse, but never a portrait of the caliph. (For the series of British coins, see *MONEY*; and for American colonial coins and those of the United States, see *COINS*.)—The issue of medals seems to have been a very early custom. Many of the largest pieces of ancient coin so called are more correctly to be considered as medals, struck for prizes in the games, or in commemoration of

great events. The Roman series of medals or medallions is very extensive in gold, silver, and brass or copper. The gold medals begin with Constantine, and continue to the fall of the empire; the silver begin under Gallienus, and continue as long; the copper from Augustus to Alexander Severus. In more modern times the art of medal making has been brought to great perfection, and most of the principal nations have adopted the plan of preserving their history by these durable monuments. The French series is deserving of special mention as the most perfect and complete in the world. It commences under Louis XI. and continues to the present date, illustrating every important event in the history of France. The English series commences under Henry VIII., but as works of art the medals have not high rank. The British battle medals form an admirable series. The Italian and German medals of modern date are very fine; the mediæval are interesting and bold in design, but rude in execution. The papal series, commencing with Paul V., are worthy of the collector's attention. One of the earliest American medals is that presented to Gen. John Armstrong for his successful attack in 1756 on the Indians at Kittanning. Several were presented to officers of the army and navy during the revolution, most of which were struck in France. Those struck since the establishment of the mint have, it is believed, all been made at the mint. This is certainly true of all from the beginning of the war of 1812 to the present time.—Many counterfeit coins and medals exist, of both ancient and modern manufacture. The Greek forgers were very skilful, and produced many fine imitations of coins, some of which are still found in as perfect a state as the originals. The Roman forged money was mostly cast. Among the most skilful of modern forgers were Giovanni Cavino and Alessandro Bassiano of Padua, who produced so many false coins that all such are generally termed Paduans. Benvenuto Cellini did not disdain this employment. Devrieux and Weber in Florence, Carteron in Holland, Congornier in Lyons, Laroche in Grenoble, and Caprara in Smyrna were among the chief counterfeiters, and their coins command high prices as curiosities. American colonial coins have been very skilfully made in New York, and rare dates are often found carefully altered from common years.—See Eckhel's *Doctrina Numorum Veterum* (9 vols. 4to, Vienna, 1792–1826); Mionnet's *Description des médailles antiques grecs et romaines*, &c. (18 vols. 8vo, Paris, 1806–'39); and Prime's "Coins, Medals, and Seals," &c. (4to, New York, 1861).

NUMITOR. See *ROMULUS*.

NUMMULITE, a large, coin-shaped, foraminiferous protozoan, living in immense numbers in the seas of the eocene tertiary epoch, and constituting strata sometimes several thousand feet thick. The so-called nummulitic limestone extends from the London, Paris, and

Mediterranean basins eastward to China, and is made up almost entirely of these thin disk-shaped fossils. The pyramids of Egypt are built



Nummulites levigatus.

partly of this limestone, and the nummulites in them were noticed by Herodotus. These fossils are also abundant in the eocene of our southern states. (See FORAMINIFERA.)

NUNCIO (Lat. *nuntius*, messenger), a prelate representing the Roman pontiff near a foreign government. Strictly speaking, he represents the pope only as temporal sovereign, but he is often commissioned to treat of spiritual affairs, and to report on the condition of churches and the character of church dignitaries, especially of candidates for the mitre. A nuncio may be resident or extraordinary; and if appointed simply to fill a vacancy in a royal or imperial court, or if resident at a minor court, he is styled an internuncio. The nuncio in France is forbidden by law to exercise ecclesiastical jurisdiction, being recognized only as the papal ambassador. The only nuncio who has ever visited the United States was Archbishop (afterward Cardinal) Bedini, in 1853. (See LEGATE.)

NUÑEZ, Alvar (CABEÇA DE VACA), a Spanish explorer, born about 1490, died in Seville in 1564. He was chief officer under Narvaez in the expedition to Florida in 1527-'8 (see NARVAEZ, PAMFILO DE), and after the shipwreck and death of the latter escaped with a few followers to the mainland somewhere W. of the mouth of the Mississippi. He travelled N. W. until he reached a mountainous country, believed to be New Mexico. Making friends of the Indians by prescribing for their ailments, he remained with them eight months. Pursuing his journey in a southwesterly direction, after incredible hardships he at length reached the Spanish settlements on the Pacific coast in 1536, with only three surviving companions, having been eight years in crossing the continent. After his return to Spain, Nuñez was appointed administrator of La Plata, and sailed for that colony at the end of 1540; but he was obliged by shipwreck to go to Paraguay, which country he first explored. Passing through the country of the Guaranis, and descending the Plata with their assistance, he reached Asuncion, where he established his headquarters, March 15, 1542. An insurrection broke out the following year, after a conflagration, Nuñez being accused of leniency toward the native incendiaries; but he arrested the ringleaders and sent them to Spain. He subjugated the

Payagoaes, a tribe on the shores of a lake which he called Rio Negro, who had killed Juan de Ayolas and 80 of his men; and exploring the river Iguayu, he reduced to subjection the Yaguesses and Clanesses, and other tribes, taking possession of their territory in the name of Spain. He was repulsed however by the Sorcorines and Agaces, who killed 63 of his men; and falling sick, he was accused by his lieutenant Domingo de Irala and sent to Spain, where the council of the Indies condemned him to banishment to Africa. After eight years he was recalled by the king, who gave him a pension and appointed him judge of the supreme court of Seville, where he resided till his death. The *Navfragios de Alvar Nuñez* was published, together with his secretary Fernandez's *Comentarios de Alvar Nuñez*, in Valladolid in 1544, and is included in Barcia's *Historiadores primitivos de las Indias occidentales* (Madrid, 1749). An abridgment of his narrative is contained in Hakluyt's "Voyages," and there is a French translation in the collection of voyages published in Paris by Ternaux-Compans, and an English translation with annotations by Buckingham Smith (Washington, 1851).

NUÑEZ, Fernan, a Spanish scholar, born in Valladolid about 1470, died in Salamanca in 1553. He was knight commander of the order of Santiago; and being also a Greek scholar, he was called the "Greek commander." Cardinal Ximenes appointed him one of the Cretan professors of Greek in the university of Alcalá, and also intrusted to him and to Lope de Astuñiga the Latin version of the Septuagint for the Complutensian polygot. In 1521 he fought on the side of the commons in the "war of the *comunidades*." Being forced to leave Alcalá, he went to Salamanca, and in the university there taught Latin, Greek, rhetoric, and the "Natural History" of Pliny, until his death. He restored the text of Seneca, and published a commentary upon his writings (Salamanca, 1543); also *Observationes in Pomponium Melam*, *Observationes in Historiam Naturalem C. Plinii* (1544), and *Glosa sobre las obras de Juan de Mena*. At the end of his life he was engaged in making a collection of Spanish proverbs, which was completed and published after his death, with the title *Refranes y proverbios glosados* (4to, Madrid, 1555).

NUPHAR. See WATER LILY.

NUREDDIN. See NOUREDDIN.

NUREMBERG (Ger. *Nürnberg*), a city of Bavaria, in the district of Middle Franconia, on the river Pegnitz and on the Ludwig's canal, 92 m. N. by W. of Munich, and 74 m. N. of Augsburg; pop. in 1871, 82,929, chiefly Protestants. The Pegnitz forms three islands within the circuit of the former double wall, connected with each other and with the city by numerous bridges. One of these bridges was the first suspension bridge, and the railway to the adjoining town of Fürth was the first operated with steam in Germany. The river divides the city into two irregular parts, the southern and

larger being called the Lorenzer side and the northern the Sebald side. The impression of quaintness and antiquity which the general aspect of the city produces is heightened by the old Gothic style of architecture, and the old-fashioned internal arrangement of many of the houses, their narrow fronts in many instances adorned with paintings. To this day nearly every modern structure within the walls is also built in mediæval style. Nuremberg ceased to be a fortified town after the war of 1866, when it was occupied for some time by Prussian troops; and the demolition of the old walls, with their hundreds of square and round towers and a moat, now in progress (1875), has already made room for new and handsome

suburbs. A large municipal loan has been contracted for a park, new bridges and canals, and for other improvements and extensions. Among the most notable Protestant churches are those of St. Sebaldus, St. James, and St. Egidius, all more or less distinguished for their works of art. The finest and largest of them all is that of St. Lawrence, a Gothic building of the 13th century. The church of the Holy Ghost, which was restored in 1850, contained the jewels of the imperial German crown from 1424 until 1806, when they were removed to Vienna. The Roman Catholic church, or *Frauenkirche*, is remarkable for its richly ornamented Gothic portal. There is also a Reformed church and a Jewish synagogue. The



The Walls and Moat, Nuremberg.

town hall is one of the most remarkable buildings of the kind in Europe, on account of its large size, as well as of its collection of paintings by Albert Dürer and other masters. Beneath the building are secret and subterranean passages; also the dungeons, scarcely six feet square, and the torture chamber, in which up to the commencement of the present century prisoners were put to the rack. A bronze statue of Dürer was erected in 1840 on the Albrecht Dürer's Platz, near the house where he resided, and a street bears the name of Hans Sachs. Nuremberg has several elegant public fountains, that on the *Hauptmarkt* (the principal square) being appropriately known as *der schöne Brunnen*. The *Gänsemarkt*, remarkable for the immense numbers of geese offered for sale, contains also an interesting fountain called *Gänsemännchen*. The public library contains upward of 50,000 volumes. Among the educational institutions are an excellent gymnasium founded by Melancthon, mercantile

and normal schools, and a school of design. A communal school founded in 1870 contained in 1875 nearly 1,000 pupils. Baron Aufsess founded in 1853 the Germanic museum for researches into national history, literature, and art, for collections of art and antiquities, and for publications relating to ancient history; it publishes a monthly periodical. Another great institution is the Bavarian museum of industry, which has lately superseded the industrial society.—Nuremberg was once one of the most prosperous of the free imperial cities, with a population of 100,000 and an extensive trade with the East and other remote parts of the world. It was not less celebrated in the history of art and literature, and in the 16th century it was the headquarters of the master singers. The reminiscences and traces of its former glories continue to make Nuremberg one of the most interesting cities of Germany. Watches were first made here, and they were long known as Nuremberg eggs. It suffered

much from the thirty years' war, during which it witnessed the first contest between Gustavus Adolphus and Wallenstein (1632), and lost its former commercial greatness; but it has improved within the present century, and is now again famous for its industrial activity, particularly in lead pencils, looking-glass plates, papier maché, machines, and ultramarine; and it is the toy shop and one of the principal hop markets of Europe. An active trade is carried on with the United States, to which goods were exported in 1872-'3 valued at \$2,737,560.

NUTATION, in astronomy, a small periodic gyratory movement in the direction of the earth's axis, by which, if it existed independent of the motion in precession, the pole of the earth would describe in the heavens a minute ellipse. This ellipse would cover a space by its longer axis of 18·5", and by its shorter of 13·7", the longer axis being directed toward the pole of the ecliptic. The nutation period is a little less than 19 years (18·6), and corresponds to that of a revolution of the moon's nodes, with which it is directly connected. The effect of the nutation on the position of the stars is combined with the effect from precession; and as both are referable to the same physical agency for explanation, their further consideration will be found in the article PRECESSION.

NUTCRACKER, a conirostral bird of the crow family, and genus *nucifraga* (Briss.). The bill is longer than the head, strong, with culmen elevated and sloping to the entire tip; the lateral margins straight; gonys very long and ascending; the nostrils basal, covered by frontal bristles; wings long and rounded, with the fourth and fifth quills longest; tail moderate, rounded on the sides; tarsi longer than middle toe, covered in front with broad scales; toes long, robust, and strongly scutellated; claws long, sharp, and curved. The



Nutcracker (*Nucifraga caryocatactes*).

common nutcracker (*N. caryocatactes*, Briss.), the best known species, is about 13 in. long, and the bill $1\frac{1}{4}$; it is about the size and shape of the European jay; the bill and feet are

brownish black; the general color dull reddish brown, blackish brown above; the whole plumage, except the top of the head and the upper tail coverts, is marked with oblong white dashes margined with dark brown at the end, largest on the lower parts; lower tail coverts and tips of tail feathers white. This bird, rare in Great Britain, is common in the woods of the mountainous parts of Europe and Asia, especially in Switzerland, and in Russia; they are usually seen in pairs, but sometimes in flocks, migrating according to the season in search of larvæ and insects, which they obtain from trees in the manner of woodpeckers; they are also fond of the seed of fir trees, and of nuts, which they break by repeated strokes of the bill; they are said to devour small birds and eggs. The nest is made in a hole in a decayed tree; the eggs, five or six, are yellowish gray with a few spots of light brown. This bold and familiar bird by its nearly straight bill seems to form a transition from the crows to the starlings, and in some respects to the woodpeckers, the last of which it also resembles in some of its habits.

NUTGALL. See GALLS.

NUTHATCH, a subfamily of tenuirostral birds of the creeper family, scattered over North America, Europe, and India and its archipelago. In the typical genus *sitta* (Linn.) the bill is entire, about as long as the head, slender, compressed, straight, and sharp-pointed, with the gonys long and ascending; nostrils in a groove, covered by bristles directed forward; wings long and acute, reaching nearly to end of tail, the first quill being very short, and the third and fourth about equal and longest; tail short, broad, and nearly even; tarsi about equal to middle toe, strong and scutellated; toes long, the outer much longer than the inner, the hind toe the longest, and all armed with sharp and curved claws. Nearly 20 species are described. They prefer dense woods, where they run rapidly up and down the trunks and branches of trees in spiral circles, examining the crevices in the bark for spiders and insects; in winter they approach houses, and feed upon seeds, grains, nuts, and other vegetable food. The largest of the American species is the white-bellied nuthatch (*S. Carolinensis*, Gmel.), about 6 in. long, with an extent of wings of 11, and the bill along the gape five sixths of an inch; the bill is black, and iris dark brown; general color above ashy blue, with top of head and neck black; under parts and sides of head to above the eyes white; under tail coverts and tibial feathers brown; concealed primaries white. This is a bold, active, and familiar bird, though generally living in retired woods; the nest is made in the hole of a decayed tree; the eggs, five or six, are dull white, spotted with brown at the larger end; the flight is rapid, and at times protracted; like others of the family, they are fond of roosting head downward. This species is spread over eastern North

America to the highest central plains, replaced to the west by a variety which differs chiefly in the more slender bill; in the southern states two broods are hatched in a season; the notes are very nasal. The red-bellied nuthatch (*S. Canadensis*, Linn.) is $4\frac{1}{2}$ in. long, with an extent of wings of 8 in.; the upper parts are ashy blue, with the top of the head black, a white line above and a black line through the eye; chin white, and rest of under parts brownish rusty. The eggs are white, sprinkled with reddish dots. This very restless and active bird is spread over North America from South Carolina to Nova Scotia, from the Atlantic probably to the Pacific. Some remain all winter in the northern states, coming into the roads and farm yards in search



European Nuthatch (*Sitta Europæa*).

of seeds. The European nuthatch (*S. Europæa*, Linn.) is one of the largest of the genus, being 6 in. long, with an extent of wings of $10\frac{1}{2}$, and bill three fourths of an inch; the upper parts are bluish gray, with the throat and cheeks white, loreal space and a band behind the eye black; lower parts light reddish yellow, and sides brownish red. Its manners are the same; the tail is not used as a support either in ascending or descending trees. It is sometimes kept in wire cages for its activity, cunning, and drollery. The bill of the nuthatches is so powerful that it is used for breaking the shells of nuts, which they fix in a cleft or hollow, whence they are sometimes called nut-crackers, a name which properly belongs to the genus *nucifraga*. The French call them *torche-pots*, from their habit of plastering up with yellow clay (*torchis*) the apertures of holes in trees which are too open to make comfortable nests. Unlike the woodpeckers, they descend trees head foremost, in which they must find great assistance in the long hind toe.

NUTMEG (Fr. *noix muscade*), the seed of the tree *myristica fragrans*, which has also been called *M. moschata*, *M. officinalis*, &c. The genus *myristica* is now placed in an order by

itself, the *myristiceæ*, which is exogenous and apetalous, and closely related to the laurel family. All of the genus are tropical, being most abundant in the islands of Asia, though



Nutmeg Flower and Leaf (*Myristica fragrans*).

some are found in tropical America. The true nutmeg tree is 20 to 30 ft. high, and has much the aspect of a pear tree; its smoothish gray bark abounds in a yellowish juice. The slightly aromatic leaves are petioled and alternate, 5 to 6 in. long, oblong, acute at the apex, entire, dark green and somewhat shining above, and whitish beneath. The tree is dioecious, but except when in flower the two sexes are not distinguishable. The male or staminate flowers are in small clusters of three to five, much resemble in shape and size those of the lily of the valley, and have three to five teeth at the apex; they are fleshy, pale yellow, very fragrant, and within have about 11 stamens,



1. Nutmeg Fruit. 2. Seed with its arillus. 3. Seed cut vertically.

the filaments of which are united to form a column surmounted by a disk, to the edges of which the anthers are attached. The pistillate flowers are externally similar to the staminate,

but usually solitary; the single pistil is without a style, and has a small two-lobed stigma. The fruit is pear-shaped or nearly spherical, about the size of the peach, and consists of a fleshy pericarp or capsule, which at maturity breaks open in two nearly equal valves, and exposes the contained seed and its appendages; this exterior portion of the fruit is about half an inch thick, of a yellowish brown color, and has an astringent juice; in collecting the crop this is thrown away as useless, but in its young state it is sometimes made into a sweetmeat with brandy and sugar. Within this husk is the seed, surrounded by a fleshy, much divided, bright scarlet *arillus*, a growth which starts from the funiculus, or little stalk which supports the ovule, and increases as that ripens, and at maturity it envelops the seed so completely that there are only here and there a few apertures through which it is visible; the *arillus* in drying loses its scarlet color and becomes yellowish brown, horny in texture, and brittle; it is then known as mace. The seed or nut within the mace has a hard, dark brown shell, about a line thick, enclosing the kernel or nucleus, which is the nutmeg of commerce; this is pale brown, and smooth when freshly deprived of its shell, but it becomes much wrinkled by drying; it consists principally of the large albumen of the seed, closely invested by a very thin inner covering, folds or processes from which penetrate the albumen and give it the well known marbled appearance; the albumen abounds in oil, which is chiefly contained in the dark veins; the embryo, lodged in a cavity at the base of the albumen, has two fan-shaped cotyledons and a very short radicle. The nutmeg tree is a native of the Moluccas, and has long been cultivated, especially in the group known as the Banda islands. The plants come into bearing in about eight years from the seed, and reach their maximum productiveness in 15 years; they are said to continue in bearing for 70 or 80 years. While the tree has ripe fruit upon it at all seasons, there are three periods of harvesting: July and August, when the fruit is most abundant, but the mace thinner than at the second harvest; November, when the nuts are smaller, with thicker mace; and March or early April, when both nuts and mace are in the greatest perfection, but the season being dry their number is not so great. The average product is about 5 lbs. of nutmegs and $1\frac{1}{2}$ lb. of mace to each tree. The fruit is gathered by means of a barb at the end of a long stick; the outer husk is removed, and the mace carefully separated by means of a knife; this is then dried in the sun, or in wet weather by artificial heat; some flatten out the mace with the hands, and dry it in a single layer, while others dry it in double blades; when it has attained the desired golden-brown color it is sprinkled with salt water, which is said to aid in its preservation, and packed in sacks for exportation. The nutmegs are placed upon gratings over a slow fire, and dried at a heat

not exceeding 140° F. until the nut rattles freely in the shell, an operation requiring about two months; the shells, then very brittle, are broken with a mallet, and the nutmegs separated. In some localities the nutmegs are dipped in milk of lime, with a view to prevent the attacks of insects, as well as to destroy their power of germinating. They have been sometimes exported in their shells, in order to preserve them more completely; but this increases the cost of transportation about one third. They are exported in tight casks which have been thoroughly smoked and then coated on the interior with lime wash. The true or round nutmeg is olive-shaped, and about an inch long, marked externally with a network of furrows which in limed nuts are filled with the lime; in the unlimed the surface is ashy brown, and they are known as brown nutmegs; internally the color is a pale reddish gray, with darker veins. Their odor is strongly aromatic, and, as well as the taste, pleasant and peculiar. The odor and the taste of mace, while closely analogous to those of nutmeg, are sufficiently distinct to be readily recognized; both contain a volatile oil, upon which their flavor and aroma depend, as well as a solid and a liquid fat. According to Bonastre, nutmegs contain, in 100 parts, volatile oil 6, liquid fat 7.6, solid fat 24, woody fibre 54, besides starch, gum, &c. The volatile oil is obtained by distilling the nutmegs with water; it is colorless or pale yellow, somewhat viscid, and possesses in a high degree the characteristic odor and flavor of nutmegs. The solid fat, known as the expressed oil of nutmegs, butter of nutmegs, and oil of mace, is obtained by heating the nutmegs to a paste and expressing this, after exposure in a bag to steam, between heated plates. It is imported in cubes of the size and shape of a brick; it is orange-colored and firm, and has the odor of nutmegs from a portion of the volatile oil it contains; it was formerly used as a stimulant external application, and as an ingredient in plasters. The chief use of both nutmegs and mace is as a condiment, especially for flavoring preparations of milk and farinaceous substances. In Germany nutmeg is thought to promote the digestion of brassicaceous plants, and is often used in dressing cabbage and cauliflower. Medicinally nutmeg ranks as an aromatic stimulant, with narcotic powers in large doses. Two drachms have been known to produce drowsiness, followed by complete stupor and insensibility; in mild diarrhoea it is regarded as a useful substitute for opium in doses of 20 to 30 grs. It is used in substance or in the form of spirit of nutmeg, to cover the taste or modify the action of purgative and other medicines. As nutmegs are not sold in the powdered state, they are not so subject to adulteration as are most other spices. If the volatile oil has been extracted by distillation, the nutmegs will be appreciably lighter; their quality can be judged by their weight when handled, and by the oozing out of the oil when the surface is pricked with a

pin. According to Chevallier, old nuts which have become riddled by insects have their holes stopped by a mixture of flour, oil, and powdered nutmegs; and in Marseilles false nuts have been fabricated from bran, clay, and the refuse of nutmegs. In either case the fraud may be readily detected by soaking the suspected sample in water.—The long or wild nutmeg is the produce of *myristica fatua*, found in similar localities with the true nutmeg; it is about $1\frac{1}{2}$ in. long, and pointed. This is the “male nutmeg” of the older writers; it is greatly inferior to the round nutmeg, some specimens being almost without flavor; it is rarely to be met with in this country; the mace of this species, called wild or false mace, is nearly devoid of flavor. It is said that the long nutmeg is sometimes mixed with the round, an adulteration at once detected by the eye. Several other species of *myristica* yield nutmegs of inferior quality. Seeds of the South American *M. bicutiba* and *M. officinalis* have their faint aroma changed by some bitter principle; the seeds of the West Indian *M. sebifera*, when treated with hot water, yield a fat of which candles are made.—For a long time the Dutch had a monopoly of nutmeg culture, and made great efforts to preserve it. They were possessors of the Banda group, consisting of ten islands, and restricted the cultivation of nutmegs to four of these, destroying the trees in all their other possessions. They made wars upon the inhabitants of islands not belonging to them, and in their treaties of peace stipulated that every nutmeg tree should be destroyed. The carrying of trees or fresh seed from these islands was prohibited under heavy penalties, and the liming of the nuts was done quite as much to kill the embryo as to prevent the attacks of insects. In order to keep the price up to their standard, the surplus crop in years of unusual abundance was burned; a Dutch writer states that he saw three piles of nutmegs burned, “each of which was more than a church of ordinary dimensions could hold.” But nature was not in sympathy with this narrow policy, and, by means against which the most rigid laws were powerless, the tree was distributed to numerous other localities; the agent in effecting this was the nutmeg pigeon, *carpophaga anea*, a fine large species found in all the Indian islands; this bird lives largely upon the fresh mace, swallowing the nutmeg with its enveloping mace, and, after this is removed by digestion, voiding the nutmeg encased in its shell, unharmed, and ready to vegetate if dropped in a favorable spot. Localities of which the Dutch did not even know the existence were thus stocked with the trees; a most fortunate provision, as in 1778 a violent hurricane and earthquake visited the Banda islands, which for years afterward furnished but few nutmegs. From 1796 to 1802, and again from 1810 to 1814, the English had possession of the Spice islands, and during these intervals the nutmeg

tree was taken to various parts of the East, to the Calcutta botanic garden, to Mauritius, French Guiana, and the West Indies, and is now beyond the control of any one government. The attempts to cultivate the tree in the West Indies have not been successful; the original trees, though they have grown to a large size, bear but a small number of fruits. The nutmegs of the Banda islands are sent to Batavia, whence they are exported; in 1871 1,080,933 lbs. were shipped from Batavia, of which 306,666 lbs. came to this country, and a larger quantity went to Singapore, from which place there were exported to the United States in the same year 810,576 lbs.—American, calabash, and Jamaica nutmegs are names given to the seeds of *monodora myristica*, a small West Indian tree of the order *anonaceæ*, and related to our custard apple or papaw. Its fruit is about the size of an orange, with numerous seeds having the flavor of nutmeg. California nutmeg is the fruit of *Torreya Californica*. (See TORREYA.) Peruvian nutmegs are the aromatic seeds of *laurelia sempervirens*. Brazilian nutmegs are the seeds of *cryptocarya moschata*, one of the laurel family.

NUTRIA. See COYUP.

NUTRITION, the growth and reparation of living organisms, animal and vegetable. Animal nutrition in its most extended sense includes the various complex processes of digestion, chylication, sanguification, circulation, respiration, assimilation, secretion, and excretion. In a more restricted sense it is the conversion of nutritive material into the various tissues of the body. The first important process of nutrition is digestion (see DIGESTION); the next is the conversion of the digested material into blood, or the process of sanguification; the third is the formation of bodily tissue from the constituents of the blood (assimilation), which is done by virtue of the power of selective appropriation by the tissues themselves. The materials appropriated by the organism may be divided into two kinds, the nitrogenous or proteinaceous, and the non-nitrogenous or hydrocarbonaceous. This branch of the subject will be found treated under the heads ALIMENT, ANIMAL HEAT, and DIETETICS. The action of the nervous system has much to do with the functions of nutrition, principally because of the influence the nerves have upon the circulation of the blood. That nervous condition which causes an increased circulation of the blood in a part will, if continued, cause its larger development, instances of which are seen in the arms of blacksmiths and the legs of dancers. Therefore exercise or training becomes an important element in influencing the nutrition and development of the whole or parts of the body. Disassimilation or the disintegration of structure, the initiative process of excretion, must always accompany a continuance of nutrition, because the detention of excrementitious matter would not only poison the fluids, and in this way prevent assimilation, but would

prevent it by not making room for assimilated tissue. Therefore, aside from stimulating the circulation of the blood, the influence of exercise upon the nutritive functions is of great importance as an aid in eliminating effete matter. The formation of abnormal growths is a variation of the nutritive process which will be found treated under the heads CANCER, EXOSTOSIS, TUMOR, &c. In cold-blooded animals nutrition may be greatly retarded and some of the functions suspended by a greatly diminished temperature; and this to a certain extent is true of some warm-blooded animals, as the bear and the woodchuck, which in winter enter into a condition of hibernation, during which time the fat and other tissues take the place of food as supporters of organic life during the temporary suspension of ingesta. (See HIBERNATION.) The discussion of the question of increased nutrition during infancy and youth, and of the balance between nutrition and waste during the prime of life, is full of interest, but does not properly find place in this article. It is attended by a consideration of questions of a philosophical nature which greatly concern the reception or rejection of modern theories of the generation and development of living organisms, inasmuch as it involves the explanation of limitation of growth by purely molecular forces. The assimilation by each organ or tissue of material of the same nature with itself is a process more easily explainable by physical theories; as it is not difficult to comprehend that histological structures may exert an influence on contiguous formative matter of similar composition, whereby it may be caused to assume a similar development. The great purpose or end of nutrition is to evolve certain vital phenomena which depend upon a variety of molecular changes requiring the maintenance of a temperature within certain limits. The interdependence of the various vital processes which are carried on in the animal system renders it difficult to form an estimate as to which are of primary and which of secondary importance. Thus, among the forces either directly or indirectly evolved by nutrition is heat. But heat, that is, a temperature between certain limits, is also a necessary condition of nutrition; digestion cannot be accomplished outside of these limits; and the same may be said of sanguification. In fevers, which as a rule are attended with increased bodily temperature, there is also greatly diminished assimilation. It must not be concluded, however, that the increased temperature is a primary cause of the diminished assimilation; on the contrary, it is to be considered as a result of the altered assimilation and metamorphosis of tissue, whereby latent is converted into sensible heat. That it nevertheless reacts, to interfere with assimilation, cannot be doubted; but the extent of its influence is difficult of estimation. Innervation also depends as well upon the maintenance of a temperature between certain limits as upon assimilation

and metamorphosis of tissue; and on the other hand, these processes are dependent to a great extent upon innervation. A certain degree of heat is as necessary for the performance of the functions of nutrition as it is for the processes of fermentation and for the various chemical transformations. Cold produces numbness, and advantage is taken of this action by the employment of refrigeration in surgical operations. The functions of sanguification and assimilation may, however, be considered as the two most important to nutrition, especially if we restrict the term as denoting simply a formative process. It may be remarked that sanguification is accompanied by a passage of matter, when becoming plastic, into the blood vessels, while assimilation is accompanied by the passage of the plastic portions of the blood out of the blood vessels through the walls of the capillaries, and virtually takes place outside of the circulatory apparatus and within the tissues themselves. As the consumption of oxygen forms a part of the processes by which nutritive material is prepared for assimilation, it really forms a part of the income of the system, and is therefore nutritive material; but it stands so distinctly apart from the other materials, that these latter, composed of animal and vegetable substances, are by common consent classed as articles of food, or alimentary principles. They have the property of being digested, that is, of being dissolved by the gastric juice and other digestive fluids, and rendered capable of absorption by the lacteal and capillary vessels, and are all capable of oxidation. Nutrition demands that the system shall be supplied not only with oxidizable alimentary principles which are capable of immediately generating force, but also with other substances, such as water and various saline bodies, and is greatly dependent upon the digestibility of food, not so much as regards time of digestibility as degree. The functions of digestion, sanguification, and assimilation are regarded as having the nature of the assimilative processes in plants, and are often called vegetative functions, their effect being to raise proximate organic principles to a condition which will permit them in undergoing oxidation, or any mode of metamorphosis, to develop some form of vital or physical force. The formative processes of nutrition may therefore be considered as supplementary to those formative processes which take place in the vegetable kingdom, by which proximate elements, under the influence of light and heat, are formed from inorganic nature and raised to a higher degree of potentiality, which potentiality is again reduced by animal metamorphoses to a lower degree, with the evolution of force. Thus the conversion of sugar into fat by animal digestion and assimilation, by which $C_6H_{12}O_6$ (glucose or starch sugar) is converted into $C_{18}H_{34}O_2$ (oleic acid), $C_3H_5O_3$ (glycerine), and other constituents of fat, is, as will be seen from the formulas, a deoxidizing process, by which a prox-

imate principle is raised to a higher potential. This raising of potential by organization, whether in the plant or animal, may be regarded as a conversion of force into matter, while the animal metamorphoses of tissue may be regarded as a conversion of matter into force, or more strictly speaking the evolution of force by matter. The precise point at which the vital transformations begin to generate force would be difficult, perhaps impossible, to determine, and probably varies under different circumstances. Thus the absorption of oxygen by the blood globules should be regarded as a force-generating process; while in the nervous system the evolution of force is to be regarded as commencing with the metamorphosis or oxidation of nerve matter. According to the experiments of Bischof and Voigt, it is concluded that all the nitrogenous material which is digested and taken into the circulation is assimilated into flesh (not limiting the term to muscular fibre, but including all protein tissues) before it undergoes metamorphosis into urea. The first series of experiments made were with an exclusively meat diet, and the first and most marked effect was an increase in the production of urea. If, at the time of commencing the experiment, the dog was ill fed and losing in weight, the feeding of a small quantity of lean meat caused such an increase in the waste (metamorphosis) that nothing was stored up and the animal continued to lose weight. An increase in the quantity of meat caused an increase in the metamorphosis and a continued loss of weight; but it was found that a continued succession of equal increments was not accompanied by equal increments of metamorphosis, but that the latter diminished, so that at length a point was reached when the quantity of ingesta balanced the amount of metamorphosis. This condition was established only when the amount of meat eaten by the dog was equal to $\frac{1}{20}$ or $\frac{1}{25}$ of his weight. An increase beyond this caused an increase in weight; but in a short time another equilibrium was reached, and a succession of increases of weight followed by states of equilibrium occurred, each state of equilibrium occupying a higher level or potential, until at last a point was reached when the animal refused to take the required quantity of food. Then followed a loss of weight and a reduction of equilibrium to a lower level. The cause of the successive diminution in the increments of metamorphosis compared to the increments of food is found in the nearly equable quantity of oxygen present in the blood. In the next series of experiments fat and lean meat were given together, and then fat alone. The addition of fat to meat produced two different effects. The fat did not prevent the increase of metamorphosis which took place when lean meat alone was used, but rather increased it; at the same time, however, on account of its greater readiness to combine with oxygen, it protected the flesh from the action of this agent. It was found that only one

third as much lean meat was required to maintain equilibrium when fat was added as when not. Sugar and starch were found to have a similar effect, but in a rather greater degree. These experiments accord with the results of Mr. Banting. (See ABSTINENCE, CORPULENCE, and BANTING.) Ranke found that in man, who is omnivorous, an equilibrium could not be maintained on lean meat alone, and that a loss of weight occurred even when eating the greatest quantity possible; but by the addition of fat or starch a state of equilibrium or increase was easily attainable.—The production of fatty matter by insects in excess of the fat contained in their food was established long ago by the experiments of Huber on bees, and confirmed by Dumas and Milne-Edwards. The experiments also of Boussingault upon pigs, whose digestive organs resemble those of man, establish the fact that fat is developed in their bodies. His experiments also indicate that fat may be produced from exclusively nitrogenous food, although more readily formed from that which is simply hydrocarbonaceous.—For a further consideration of the subject, see "Physiology of Man," by Austin Flint, jr., M. D. (1866-'75); "A Treatise on Human Physiology," by John C. Dalton, M. D. (latest ed., 1870); and "Principles of Human Physiology," by W. B. Carpenter (latest ed., 1874). The subject of vegetable nutrition is treated in the article PLANT.

NUTTALL, Thomas, an American naturalist, born in Yorkshire, England, in 1786, died at Nutgrove, St. Helen's, Lancashire, Sept. 10, 1859. He learned the trade of a printer, and studied natural history in the United States. He explored the great lakes and the upper branches of the Mississippi, and in 1810 ascended the Missouri as far as the Mandan villages. In 1819 he explored the Arkansas river and the neighboring regions, and published "A Journal of Travels into the Arkansas Territory" (Philadelphia, 1821). He travelled also on the Pacific coast, and published several papers on the shells and plants of that region. From 1822 to 1834 he was professor of natural history in Harvard college, and curator of the botanical garden. Subsequently he returned to England, and lived on the estate of Nutgrove, bequeathed to him on condition that he should reside there. His principal works are: "Manual of the Ornithology of the United States and Canada" (2 vols. 12mo, Boston, 1834), and "The North American Sylva" (3 vols. royal 8vo, Philadelphia, 1842-'9), forming a continuation to Michaux's great work on the forest trees of North America.

NUX VOMICA, a name formerly given to some other seeds, but now applied to a drug which is the produce of *strychnos nux-vomica*, a tree of the family *Loganiaceæ*. It is a small tree with opposite, three- to five-nerved, smooth leaves, and terminal corymbs of tubular flowers with a five-parted limb; the fruit is smooth, about the size and color of an orange, with a

somewhat hard shell, and containing a soft gelatinous pulp in which are imbedded several seeds. The wood of the tree is white, hard, and durable; and the bark is gray, very brittle when dry, and intensely bitter. The seeds are scarcely an inch in diameter, round, flat, slightly convex on one surface and concave on the other, and covered with short silky hairs, of an ash-gray or yellowish color, which are directed from the centre toward the circumference. The seeds are called by the Germans crow's eyes, and in this country they are called dog beans, and sometimes, on account of their drab color, "Quaker buttons." The mass of the seed consists mainly of the albumen, at the base of which the embryo is placed in a small cavity. The albumen (which in botany is the nourishment provided for the embryo, without reference to its chemical characters) is exceedingly horn-like and tough, and in small sections semi-transparent; it is one of the most



Nux Vomica Tree (*Strychnos nux-vomica*).

difficult of drugs to powder, but after thorough steaming the seeds are broken up with much less difficulty. The taste of nux vomica is acrid and bitter. The highly poisonous nature of the drug has long been known; while in man and carnivorous animals it readily destroys life, herbivorous animals are less affected by it; a few grains destroy a dog, while it requires several ounces to kill a horse, and a bird of the countries in which the tree grows is said to eat the seeds with impunity. The first accurate analysis of nux vomica was made in 1818 by Pelletier and Caventou, who found the alkaloids strychnia and brucia, in combination with peculiar acids; and a less important alkaloid, igasuria, has since been detected. The most active of these principles is strychnia. (See STRYCHNIA.) Nux vomica in powder was formerly employed in medicine, but being variable in its strength and uncertain in its operation, strychnia is preferred on account of its greater uniformity, though some physicians prefer the alcoholic extract of the seeds as repre-

senting more correctly all the constituents of the drug. A pound of nux vomica thoroughly exhausted by alcohol gives, upon evaporation of the tincture, about one ounce of extract. In doses of three or four grains of the powder or half a grain of the extract, nux vomica has been used as a tonic and a stimulant of the secretions; its medicinal and poisonous effects are given under STRYCHNIA. About 1850 much excitement was created in England by the statement of a French chemist that nux vomica was largely used in the preparation of English bitter beer. The leading brewers demanded an investigation, and samples of their beer, procured at different places in such a manner as to preclude any preparation for the examination, were found to be entirely free from other than the proper constituents of malt liquor. Still the fact remains that as many tons of nux vomica are now imported into England as there were pounds 25 years ago, and the increased consumption is not accounted for. The bark of the nux vomica tree is of interest from the fact that at one time a large quantity of it was sent to Europe, and, finding no sale under its proper name, it was placed in commerce as Angostura bark, a most dangerous substitution of a highly poisonous bark for one which is simply an aromatic tonic, used much the same as Peruvian bark. The true Angostura is separable into laminae and easily broken or cut, while the nux vomica bark is the opposite in these as well as in other characters.—St. Ignatius's bean is so much richer in strychnia than nux vomica, that it is generally used in the preparation of that alkaloid. The seeds are about the size of an olive, convex on one side and angular on the other, dark brown, and of an exceedingly horny texture. They are now regarded as the product of *strychnos Ignatia*, a climbing species of the Philippines, with a fruit as large as a melon. Other species of *strychnos* have fruit with edible or innocuous pulp and poisonous seeds; among which is *S. potatorum*, the clearing nut of India, which clarifies water if placed in a vessel whose interior has been rubbed with one of the nuts. *S. Tieute* affords the arrow poison of Java, and the South American Indians obtain a similar poison from other species. (See WOORARA.)

NYACK, a village of Rockland co., New York, on the W. bank of the Hudson, 30 m. above its mouth, and nearly opposite Tarrytown, with which it is connected by a steam ferry, and at the terminus of the Northern railway of New Jersey; pop. in 1870, 3,438. It is situated at the foot of the Nyack hills, is lighted with gas, has water works and a fire department, and is much resorted to in summer by citizens of New York. Broad drives lead to Rockland lake on the north and Piermont on the south. Steamers run to New York, and large quantities of milk, fruit, and vegetables are shipped to that city. The village contains a manufactory of wooden ware, three of shoes, one of pianos, a stone crusher, three planing

mills, two banks, several hotels, six schools, including the Rockland female institute, two weekly newspapers, a monthly periodical, and nine churches.

NYAM-NYAM, a negro tribe in N. central Africa, whose territory extends from lat. 4° to 6° N., and from lon. 24° to 29° E., and is bounded N. by the country of the Bongos, E. by that of the Mittoos, S. by that of the Monbuttoos, and W. by various tribes whose names are unknown. The first information respecting this tribe was given in 1859 by Petherick, and in 1863 by the Italian Piaggia; but Schweinfurth in 1870 was the first to traverse a large portion of the country. The Nyam-Nyam are cannibals, but in some respects more civilized than the neighboring tribes. They appear to have taken possession of their present country at a comparatively recent period, after conquering several other tribes. They live in conical straw huts, there being separate ones for men and women. The chiefs or sultans, of whom there are about 100, have very extensive powers over their subjects. Every settlement has a divan or *bancajo*, in which public affairs are discussed and decided, and where the boys are accustomed to stay from their eighth year. The Nyam-Nyam show considerable skill in manufacturing earthen and iron ware, especially in the forging of weapons.

N'YANZA, a word used by the natives of central Africa to designate large bodies of water, but especially applied to the two great equatorial fresh-water lakes which are now believed to be the proximate sources of the Nile. **I. Victoria N'yanza**, the eastern of these lakes, called also Ukerewe by the natives, is situated directly under the equator, between lat. $2^{\circ} 24'$ S. and $0^{\circ} 21'$ N., at an elevation, according to Speke (1862), of 3,308 ft. above the level of the sea. According to Baker, however, its elevation must be considerably higher, as he found its outlet, Somerset river, to flow at M'rooli at an altitude of 4,061 ft. Its western limit is not far from lon. $31^{\circ} 30'$ E., but the width of the lake has not been ascertained, although it must be considerable, as the opposite side cannot be seen from that portion of the western shore which has been explored. The Victoria N'yanza was discovered on July 30, 1858, by Capt. J. H. Speke of the British Indian army, who visited its southern extremity, in about lon. 33° E., while upon the expedition with Capt. Richard F. Burton which resulted in the discovery of Lake Tanganyika, although he was not accompanied by his associate on this part of the journey. Convinced that he had found one of the great feeders of the Nile, Capt. Speke, on returning to England in the following year, organized an expedition for its further exploration, and in 1862 again reached the vicinity of its shores, from Zanzibar, this time in company with Capt. (now Col.) J. W. Grant. They travelled along its western and northern margin, though seldom within view of its waters, to the outlet of the

lake, in about lat. $0^{\circ} 21' 19''$ N., lon. $33^{\circ} 30'$ E. This is a magnificent river from 600 to 700 yards wide, flowing northward over a beautiful cataract, having a descent of about 12 ft., to which they gave the name of Ripon falls. This stream, now known as the Somerset river, Speke believed to be the White Nile; and his conjecture, founded upon native information, that it flowed into another lake further W., whence it emerged as the Nile itself, has since been verified by the discovery of the Albert N'yanza. Our actual knowledge concerning the Victoria lake is thus confined to the S. extremity and its N. W. shores. As seen from the south in 1858, it resembled a vast flood overspreading a flat surface; and though said by the natives to be very deep, its appearance did not confirm the statement. According to Speke, if any part of the adjacent country, which is low, well wooded, and dotted with hills, were inundated to the same extent, it would wear the same aspect. The water was of a dirty white color, but good and sweet. A small river flows into the S. end of the lake near a group of islets, N. of which are two islands of considerable size. Information derived from the Arabs represents the E. shore as studded with islands; but according to native accounts no rivers of any importance find their way into the lake on that side, the country which stretches eastward toward the mountain range of Kenia and Kilimanjaro being scantily watered and containing many salt lakes and salt plains. The region S. of the Victoria N'yanza is occupied by the numerous petty states which constitute the extensive territory known as Unyamuezi. The principal feeder of the lake from the west is the Kitangulú river, which enters it near the 1st parallel of S. latitude. This river is believed to rise near Mt. M'fumbiro, a cone-like summit about 100 m. W. of the lake, the altitude of which is estimated by Speke at 10,000 ft. The W. shore is in the kingdom of Karagúé, and the N. W. and N. borders are included within the Uganda country. The surface of this moist, temperate, wooded, well cultivated, and populous region slopes toward the lake, near which the lands generally are low, grassy, and intersected by numerous rush drains. Further back, the scenery is more hilly, and the country is penetrated by several mountain spurs from the west, of moderate elevation.—The Victoria Nile, or Somerset river, as Speke called the outlet of the Victoria N'yanza, flows from Ripon falls northward and westward. It has actually been traced by Speke somewhat further down than lat. 1° N., and its course below M'rooli, the capital of Unyoro, in lat. $1^{\circ} 38'$ N., lon. $32^{\circ} 20'$ E., has become tolerably well known through the later explorations of Baker. At Karuma falls, near lat. $2^{\circ} 15'$ N., lon. $32^{\circ} 26'$ E., where there is a descent of about 5 ft., the river bends suddenly westward and flows thence in that direction, between cliffs and over a succession of rapids, to Murchison falls,

where its width contracts from 200 to about 50 yards, and its waters rush furiously through a rocky gorge and descend at one leap a distance of 120 ft., in a cataract of snowy whiteness, forming the greatest waterfall of the Nile. The river now broadens until its banks are 500 yards apart, and moves with sluggish current slowly westward until, about 20 m. from the falls, it joins the second lake. **II. Albert N'yanza.** On their journey N. from the Victoria N'yanza Speke and Grant heard of this lake under the name of Luta N'zigé, but did not visit it, as they left the Somerset river near Karuma falls, and did not see the Nile until they reached lat. $3^{\circ} 32' N.$, about a degree below its exit from the then undiscovered body of water thus designated. On Feb. 15, 1863, near Gondokoro, they met Mr. (now Sir) Samuel Baker and his wife, on their way S. to discover the sources of the Nile, and communicated to them intelligence of the existence of this second lake. Baker then left the Nile region and pushed southward into Unyoro, N. of the Victoria lake, where he learned that the proper native name for the object of his search was not Luta N'zigé, but M'wootan N'zigé, the waters of which he first descried and reached on March 14, 1864, in lat. $1^{\circ} 15' N.$, lon. $30^{\circ} 50' E.$, at a small fishing village named Vacovia, on the E. shore. Thence the lake, which he called Albert N'yanza, in honor of the prince consort, spread out apparently a limitless expanse of white water toward the south and southwest, while on the opposite western shore rose blue mountains to a height of about 7,000 ft. above the lake level. The width at this point appeared to be 50 or 60 m. South of Vacovia the Albert N'yanza has never been explored, but the natives describe it as extending directly S. beyond the 1st parallel of S. latitude, where it bends westward; no information has been obtained as to its extent any further than this. The E. coast of the N. portion, however, was carefully traced by Baker, who followed it northward, in a canoe voyage of 13 days' duration, as far as the mouth of the Somerset river or Victoria Nile, at Magungo, in lat. $2^{\circ} 16' N.$ The shore trends N. N. E., and for some distance above Vacovia is fringed with precipitous cliffs 1,500 ft. high; but these decrease in elevation toward the north, and the lake loses its character of a deep inland sea, narrowing to a width of from 15 to 20 m., while the banks become marshy and are bordered by thick beds of reeds. The mountains on the W. coast opposite Magungo appear to be about 4,000 ft. in height. From the same village the exit of the Nile proper or Bahr el-Abiad from the N. E. extremity of the lake was visible, at a distance which Baker states to be 18 m., but which is nearly 30 m. according to his map, from which it appears that the point of the river's departure must be near lat. $2^{\circ} 45' N.$, lon. $31^{\circ} 30' E.$ The lake extends toward low ground on the northwest, but how far is unknown. The corrected altitude of

its surface above the sea level, as determined by Baker at Vacovia, is 2,720 ft. His map indicates that the minimum distance of the lake from the Victoria N'yanza cannot much exceed 100 m., and represents the altitude of the intervening country of Unyoro, which extends down the E. shore to the equator, as averaging 4,200 ft. The W. coast is occupied by the mountainous kingdom of Malegga. The Albert N'yanza is thus situated in a vast longitudinal depression crossing the equator, bounded E. by highlands and W. by mountains. Its waters abound in fish, some varieties of which exceed 200 lbs. in weight; innumerable hippopotami and crocodiles frequent its banks, and the adjacent regions are the abode of large herds of elephants. According to Baker, the Victoria N'yanza is the first source of the Nile, which collects its eastern affluents; while from the Albert N'yanza, which receives those and all the other waters of the equatorial basin, the river issues at once as the great White Nile.—See Speke's "Journal of the Discovery of the Source of the Nile" (1863), and Baker's "Albert N'yanza" (1866; new ed., 1870), and "Ismailia" (1874). (See NILE.)

NYASSA, a lake in S. E. Africa, with its S. extremity situated about 350 m. W. of the town of Mozambique, in lat. $14^{\circ} 25' S.$, lon. $35^{\circ} 10' E.$, whence its waters are known to extend northward upward of 200 m. The width of the main body of water varies from 20 to 60 m. The southern portion consists of two arms, between which rises Cape Maclear, a lofty headland with its summit 2,000 ft. above the surface of the lake. From the S. extremity of the eastern arm flows the river Shiré, which joins the Zambesi about 90 m. from the sea. This arm of the lake is about 30 m. long and from 10 to 12 m. wide, while the length of the western arm is not more than half as great. According to Dr. Kirk, the elevation of Nyassa above the level of the sea is 1,522 ft. The country on both sides is mountainous. The lake is known to be very deep, in some places over 40 fathoms; and its clear, blue waters are frequently lashed into waves of extraordinary magnitude by the sudden and violent storms to which it is subject. Both the E. and W. banks are populated, and the latter has been explored nearly to lat. $11^{\circ} S.$; but, so far as known, the northern extremity has never been visited by any European. Nyassa was first laid down on Portuguese maps as early as 1546, but no precise information concerning its position was obtained until the time of Manoel Godinho (1663), who learned in India from a Portuguese traveller that it communicated with the Zambesi through a river which he called Zachaf. In 1859 it was doubly discovered: on Sept. 16 by Dr. Livingstone, who reached it through the valley of the Shiré; and on Oct. 19 by Dr. Albrecht Roscher of Hamburg, who was attacked by two of the natives on the E. shore and killed by poisoned arrows, shortly after making his way to the lake from Kilwa. Nyassa has since been ex-

plored, in 1861 by Livingstone and Kirk, in 1863 and 1866 again by Livingstone, and in 1867 by Mr. E. D. Young.

NYBORG, a fortified town of the island of Fünen, Denmark, on the Great Belt, 16 m. E. S. E. of Odense; pop. about 4,000. It is defended by a strong citadel, and is the place where the Sound dues were formerly paid by vessels passing through the Great Belt. It contains ship-building yards, and has a large trade in grain.

NYCTALOPIA (Gr. *νύξ*, night, *α* privative, and *ὤψ*, eye), night blindness. The disease varies in intensity; in mild and recent cases there being only a greater or less indistinctness of vision after sunset, while in others the patient is entirely unable to distinguish objects by the light of the moon or by artificial light, or even to see a lighted candle placed directly before the eyes. During the day the pupils move naturally, but after nightfall they remain usually dilated and sluggish or motionless. In old cases they are occasionally observed to be contracted. The disease is said to be sometimes congenital and hereditary; more commonly it is produced by continued exposure to the bright light of the sun during the day, particularly when the strength is impaired by over-fatigue, watching, and a faulty diet. It is of common occurrence in warm and tropical climates, particularly among strangers from a more temperate region. It sometimes seems to be produced by the reflection from snow. Avoidance of exposure to excessive light is in general all that is necessary to obtain a cure. If the disease is accompanied by any gastric or other derangement, this should of course be attended to. When the complaint has proved obstinate, a succession of blisters to the temples has been found beneficial.—The term *hemeralopia*, day blindness, has been applied to a defect of vision the opposite to *nyctalopia*. Beyond the photophobia common to those who have been long habituated to darkness, to albinos, and to children laboring under strumous ophthalmia, this has no real existence.

NYE, a S. E. county of Nevada, bounded E. by Utah and S. W. by California; area, 24,200 sq. m.; pop. in 1870, 1,087. The N. part consists of regularly alternating mountains and valleys, running N. and S. In every range there are mining districts, and the valleys contain large areas of arable and grazing land. The mountain streams are numerous. The S. part is mostly a high table land, falling off toward the west into the Death valley in California, and toward the east to the Colorado river. Reese river rises in the N. W. part, and Amargosa river in the S. part. According to the census of 1870, there were 15 quartz mines in operation, of which 14 produced silver and one gold and silver. The chief productions

were 1,314 bushels of wheat, 1,390 of oats, 14,260 of barley, 7,065 of potatoes, and 1,138 tons of hay. The value of live stock was \$42,822. There were 5 saw mills and 5 quartz mills. Capital, Belmont.

NYERUP, *Nasmus*, a Danish antiquary, born at Ørsted in the island of Fünen, March 12, 1759, died in Copenhagen, June 28, 1829. He was educated at Copenhagen, where in 1796 he became professor of literary history and university librarian. He wrote several valuable bibliographical works, but his reputation rests chiefly on his antiquarian compilations, of which the most noteworthy is his "Historical and Statistical Exhibition of the Condition of Denmark and Norway in Ancient and Modern Times" (2 vols., 1802-'6); and more especially on his numerous writings in regard to the ancient Danish language and literature.

NYKÖPING, a town of Sweden, in the län of Södermanland, on a bay of the Baltic, 50 m. S. W. of Stockholm; pop. about 5,000. It is traversed by the small Nyköping river, which connects the great network of lakes in the interior with the Baltic. The new town contains a fine square with a fountain, several churches, and a palace for the provincial governor. Steam engines, locomotives, iron-clad ships, &c., are produced. There are only relics of the old castle, once one of the strongest in Sweden; it was destroyed by a fire in 1665. In 1719 the old town was devastated by the Russians.

NYMPH. See *CHRYSALIS*.

NYMPHÆA. See *Cos*.

NYMPHS (Gr. *νύμφαι*), in Greek and Roman mythology, inferior female divinities, presiding over various departments of nature. The Oceanids, daughters of Oceanus, and the Nereids, daughters of Nereus, were salt-water nymphs, the latter dwelling in the Mediterranean, and especially in the Ægean sea. The naiads were nymphs of fountains and other fresh waters, those presiding over lakes being also called limniads, and those over rivers, potamids. The nymphs of mountains and grottoes were called oreads or oreitiads; of forests and groves, dryads and hamadryads; and of vales, glens, and meadows, naphææ and limoniads. They were also named from certain races or localities with which they were associated, as Nysiads, Dodonids, Lemniæ, &c.; and were subdivided into still other classes, with almost innumerable names and attributes. Sacrifices were offered to the nymphs of such productions of nature as abounded in their several haunts, but never of wine. They were not immortal, though always youthful, and often perished with the objects of their care; or the object was said to languish and die when the guardian nymph forsook it.

NYSSA. See *TUPELO*.

O

O, THE 15th letter and the 4th vowel of the English alphabet. Phonetically it occupies a position between A and U, with both of which it is sometimes interchanged. O and U appear indeed to have had a common origin, and it has been supposed that the old Greek alphabet did not contain *upsilon* (*v*), while the Etruscan had U but not O; hence the frequent occurrence of O in Greek (in the double form of *o* and *ω*) and of U in Latin. O is also interchanged with the Greek and Latin long *e*, equivalent to the English *a* (Gr. *κῆρ*, Lat. *cor*); with *ou* (Fr. *tout*, Lat. *totus*); *uo* (especially in Italian, as in *cuore*, Lat. *cor*); *eu* (Fr. *lieu*, Lat. *locus*); *au* (Fr. *or*, Lat. *aurum*); *ue* (Span. *bueno*, Lat. *bonus*); *ea* (*cleave*, *clove*); *i* (*write*, *wrote*); *ei*, pronounced as the English long *i* (Ger. *nein*, Eng. *no*); and short *e* (Lat. *velle*, *vol*; *vermis*, Eng. *worm*). In English O has four sounds: long, as in *note*; short, as in *not*; obscure, as in *occur*; like *oo*, as in *move*, *wolf*. There are also some exceptional cases in which it takes the sound of short *u*, as in *love*, *some*; of broad *a*, as in *lord*; and of short *i*, as in *women*. It forms the following diphthongs: *oa*, sometimes equivalent to long *o*, as in *coal*, or broad *a*, as in *broad*; *oe*, sounded like long *o* in *foe*, *oo* in *canoe*, and long *e* in *fetus*; *oi*, having its proper sound as in *voice*; *oo*, long as in *boon*, short as in *good*, like long *o* as in *floor*, or like short *u* as in *flood*; *ou*, as in *house*, or like short *u* in *double*, *oo* in *soup* and *could*, long *o* in *though*, short *o* in *hough*, and broad *a* in *ought*; *ow*, sounded like *ou* in *house* or like long *o* (*vow*, *low*); and *oy*, like *oi*. O is employed particularly to express admiration, warning, compassion, and entreaty, and occurs as an interjection in all languages.—In inscriptions, O stands for *optimus*. As a prefix to Irish names, it signifies “grandson of;” thus, O’Connor is equivalent to grandson of Connor. In freemasonry it denotes Orient; in French geography, *ouest*, west; in German geography, *Ost*, east. In Greek numeration *o* stood for 70 and *ω* for 800, and in the middle Latin O stood for 11, or with a dash over it, *ō*, for 11,000.

OAHU, one of the Hawaiian islands, the fourth of the group in size, in lon. 158° W., and between lat. 21° and 22° N.; pop. in 1872, 20,671, of whom 3,129 were foreigners. The island is roughly quadrilateral; its extreme length is 33 m. and its breadth is 20 m. It is of volcanic formation and mountainous, but the highest peaks are clothed with vegetation. There are two distinct ranges of mountains, the windward and the leeward, called respectively the Konahuinui and the Waianae ranges. They exhibit few craters in perfect condition, but there are groups of tufa cones along the shore. The island is well watered, and its valleys are productive, the most fertile region lying on the northeast between Kaala and Kahuku.

Honolulu, the capital of the Hawaiian kingdom, is on the S. side of Oahu; its port is the best in the islands. It has regular steam communication with San Francisco, about 2,000 m. distant. The shores of Oahu are mostly fringed with coral reefs, often half a mile broad.

OAJACA. I. A maritime state of Mexico, bounded N. W. by Puebla, N. E. by Vera Cruz, S. E. by Chiapas, S. by the Pacific ocean, and W. by Guerrero; area, 27,389 sq. m.; pop. in 1869, 646,729, and in 1872, as reported by the governor, 662,463. It is extremely mountainous, being traversed from S. to N. by the great chain of the Mexican Andes, which, after entering from the south in a single ridge almost midway between the two oceans, bifurcates, sending N. the two separate branches which flank the vast central plateau. These lateral ridges cut the country into valleys and gorges of no great extent, but of surprising beauty and fertility. The most remarkable summits are Zempoaltepec in the district of Villalta, with an elevation of 10,542 ft. above the sea, and whose crest commands magnificent views of both oceans; the Sirena, S. of San Juan de Ozolotepec; Chicahuastla, in Teposcolula; Colcoyan, S. of Huajuapam; Jilotepec, in Tlaxcolula; and Mijes, S. of Quetzaltepec. The principal rivers are the Quiotepec, which rises in the mountains N. of the city of Oajaca, collects the waters of the Tonto, and unites with the Cosamaloapam after a course of 120 m.; the Villalta, also a tributary of the Cosamaloapam, descending from the Zempoaltepec, and having a course of more than 100 m.; the Tehuantepec, flowing from the mountains of Quiechapa, Amatlan, and Minas, and falling into the Pacific at Ventosa; and the Atoyac or Verde, which takes its rise near the capital, and empties into the Pacific after a winding course of nearly 170 m. The climate presents all the variations characteristic of the torrid and temperate zones, and is mostly very salubrious. There are in Oajaca 8 gold and 17 silver mines, besides 39 mines of silver and gold, 5 of iron, and 4 of lead; but the mining operations are comparatively limited for want of adequate labor. The agricultural products include maize, chilli, beans of several kinds, wheat, barley, rice, aniseed, coffee, cotton, wax, and tobacco; but the great staples are the sugar cane, cochineal, indigo, and cacao, the last being equal in quality to the best from Carácas. The annual yield of cochineal is about 500,000 lbs.; and the mean annual value of all the products is \$2,250,000. Oajaca is essentially an agricultural country; but it has likewise a large number of manufactures, the more important being soaps, sugar, *aguardiente* or cane rum, beer, gunpowder, and palm-leaf hats; and there are numerous flour mills, two salt works, 10 tanneries, and about 70

looms. The school statistics in 1873 were as follows: 709 primary schools, with 28,166 male and 2,089 female pupils; one female academy, with 826 pupils; a state literary institute, pontifical seminary, and Catholic college, having 504, 62, and 291 students respectively. The state library, in the capital, contains 13,000 volumes. Oajaca is divided into 25 districts. **II.** An inland city, capital of the state, in the delightful valley of the same name, on the left bank of the Atoyac, 210 m. S. E. of Mexico; lat. $17^{\circ} 10' N.$, lon. $97^{\circ} 30' W.$; pop. about 25,000. The streets are spacious and regular, and the houses substantially built, and for the most part neat in appearance, though many of them are of adobe. The principal buildings are the cathedral, the Santuario de la Soledad and other churches, and convents, gorgeously decorated, the cabildo or city hall, and the episcopal palace. There are several handsome squares or plazas, embellished with trees and flowers; and the surrounding country is exceedingly picturesque, being literally covered with gardens and cochineal groves. Education is zealously promoted. The general hospital is said to be one of the best organized in the republic. The chief occupations of the people are the manufacture of sugar, beer, indigo, cane rum, and especially of cacao, for which this city is celebrated, and the preparation of cochineal. Palm-leaf hats are extensively made, and silk weaving employs a small number of hands. Oajaca was injured by an earthquake on May 11, 1870.

OAK (Ang. Sax. *ac*), the English name of trees of the genus *quercus*. Some botanists place all the trees and shrubs which have their unisexual flowers in catkins in one family, the *amentaceæ*, while others, including American authorities, make several families, placing *quercus*, the oak, *fagus*, the beech, *castanea*, the chestnut, and two less known genera, in a family by themselves, the *cupulifera*, which thus restricted comprises trees (rarely shrubs) the fruit of which consists of nuts contained in an involucre cup (whence the name) or dehiscent capsule. The genus *quercus* consists of trees and shrubs with alternate simple leaves and monœcious flowers; the staminate flowers are in slender, usually pendulous, often interrupted catkins, the bracts or catkin scales falling early, their flowers consisting of five to twelve stamens within a two- to eight-parted calyx. The fertile or female flowers are solitary or clustered; they have a three-celled ovary with two ovules in each cell, and a three-lobed stigma, and are surrounded by an involucre of small imbricated scales; in fruit the ovary becomes, by abortion of two of the cells and all but one of the ovules, a one-seeded nut (acorn), surrounded at its base by a woody cup, which is formed by the enlarged and indurated scales of the involucre to the ovary. In his elaboration of the genus, Alphonse de Candolle gives more than 250 accepted species of *quercus*, some of which have several well marked varieties, and a number of doubtful

species. Oaks are found over nearly the whole northern hemisphere, except the extreme north, and in the tropics along the Andes and in the Moluccas. There are both deciduous and evergreen species, presenting a wonderful difference in their leaves and general aspect, some being small shrubs, but all readily recognized by their peculiar fruit, consisting of an acorn and a cup, which never completely encloses the nut. Some of the oaks furnish valuable timber, and one species yields cork. (See CORK.) Tannic and gallic acids are abundant in the oaks, and the bark of many is valuable for tanning, while in some these principles are developed in a remarkable degree in the galls produced by the punctures of insects. (See GALLS.) The nuts not only supply human food, but that of various animals. In England in early times the acorns were regarded as the most useful product of the tree, and wooded property was valued according to the number of swine it would support. In some of our western states the mast, or "shack," is an important element in the production of pork. In the Atlantic states there are about 20 accepted species of oak, with about as many sub-species or varieties. The species vary so much that the genus is puzzling to botanists, and its difficulties are increased by the production of several natural hybrids. The character of the wood is affected by the soil and locality in which the trees grow, and lumbermen make distinctions not recognized by botanists. In some of our oaks the flowers of spring perfect their fruit the same autumn; hence the acorns appear upon the wood of the season's growth, in the axils of the leaves, and often raised on a peduncle or stalk. These are called annual-fruited oaks, and the group is also marked by other characters: the leaves when not entire have their lobes or teeth destitute of bristle-like points; the abortive ovules are found under the seed; the kernel is often sweet, and the timber is more valuable than that of the next section. The biennial-fruited oaks perfect their acorns the year after flowering. After the staminate flowers fall, the pistils undergo little change, but remain until the following spring, when they mature and ripen about 18 months after blossoming. In these oaks the ripe fruit is found below the growth of the season; the peduncles are short or none, and the kernel bitter; the abortive ovules are at the top of the seed; the leaves when not entire have their lobes terminated by bristle-like points. Each of these sections is subdivided into several smaller groups, characterized by the foliage.—Beginning with the annual-fruited species, the white oak (*Q. alba*) is one of the most useful as well as most generally distributed. In this, as in others, the leaves present much variety, and trees growing side by side often have leaves sufficiently unlike to belong to different species; they are always deeply lobed, with the lobes obtuse; they are pubescent below when young, smooth when

old, shining green on the upper and pale on the under surface; the acorns are about an inch long, in a hemispherical saucer-shaped cup, which is roughened with rounded tubercles;



White Oak (*Quercus alba*).

the kernel is usually sweet, but varies in different trees, and the better kinds when roasted are not an unwelcome substitute for chestnuts; the tree fruits so seldom that it is the popular notion that it bears only once in seven years. It is found as far north as Lake Winnipeg, and extends to Florida and the gulf states. The wood of the white oak, on account of its hardness, toughness, and durability, is regarded as



White Oak Tree.

fitted to a greater variety of uses than that of any other tree except the white pine; it is largely employed in ship building, carriage and wagon making, and cooperage, and for various

agricultural implements. Among its minor uses is the making of coarse baskets, as the wood of young trees is easily divided into splints of great flexibility and strength; similar splints are used for chair bottoms. The bark is valuable for tanning, and on account of its astringency is used in medicine both internally and as a bath. As a fuel white oak is much inferior to hickory, but it makes excellent charcoal. The white oak is long-lived, and specimens supposed to have been in existence before the settlement of the country are still standing; it is of slow growth, but does not cease to grow as it gets larger. On account of the great value of the wood, the trees are rapidly disappearing, and no provision is made for future supplies. As an ornamental tree the white oak is much esteemed. In autumn the leaves turn to a characteristic purplish color, and remain upon the tree until a new growth begins in spring. The post oak (*Q. obtusiloba*), also called rough and box white oak, is smaller,



Post or Rough White Oak (*Quercus obtusiloba*).

with a denser foliage, and is easily distinguished by its leaves, which are pale and rough above and yellowish downy beneath; their upper lobes are much larger than the lower, and one- to three-notched; the acorn is one half to three fourths of an inch long, ovoid, with a deep saucer-shaped cup one third to one half its length, and a sweet kernel. This tree is found from New England southward, preferring poor and dry soils, and in the western states it is found on the tracts of poor land known as post-oak barrens. It rarely grows over 40 or 50 ft. high and 12 to 18 in. in diameter; it has such a tendency to branch, producing even when growing thickly branches very low down, that it does not afford timber of much length; its wood is fine-grained, strong, yellowish, and regarded as more durable than any other except the live oak; its durability when used for posts has given it its common name; it is considered the best wood

for staves, and is used for knees in ship building. The burr oak (*Q. macrocarpa*), closely related to the two preceding species, is in some localities known as the over-cup, and in others



Burr or Over-cup Oak (*Quercus macrocarpa*).

as the mossy-cup white oak; it is of medium height with irregular branches; its large leaves are obovate in general outline, deeply lobed below the middle, often nearly to the midrib, and broader and more entire toward the apex, smooth and dark green above, and downy or light-colored beneath. The acorn is broadly ovate, 1 to 1½ in. long, and wholly or partly immersed in its cup, which is thick and woody, and very conspicuous, not only on account of its size, but from being covered with prominent scales, the upper of which terminate in leafy points, to form a mossy fringe to the edge of the cup; the relative size of the acorn to the cup varies greatly. The burr oak is much more abundant in the western than in the Atlantic states, and in richer soils than the white and post oaks. When it has room to develop it forms a handsome tree; and as it grows more rapidly than most other oaks, it is well adapted to ornamental planting, while the value of its timber, being nearly equal to that of white oak, renders it desirable for forest planting. As its wood is preferred for making the treenails or wooden pins used in ship building, this species is in some parts of New England called pin oak, a name which properly belongs to another species. The southern over-cup oak (*Q. lyrata*) is found in swamps along rivers from North Carolina south and west, where it forms a large tree, 70 to 80 ft. high, with its seven to nine triangularly lobed leaves crowded at the ends of the branches. The acorns are an inch long and considerably broader, and enclosed in a cup which is clothed with rugged scales and almost conceals the nut.—In the group of chestnut oaks the leaves are not lobed (except slightly in one species), but are coarsely sinuate-toothed, and white or

whitish-downy beneath; the cup hoary, hemispherical or somewhat depressed, about half as long as the oblong-ovoid edible acorn. The swamp white oak (*Q. bicolor*) is found in low grounds, especially in the northern and western states, and frequently attains a large size; its leaves are intermediate between the chestnut and white oaks, being sometimes simply sinuate on the margin, and at others more pinnatifid than toothed, but in all cases wedge-shaped at the base, and hoary beneath with a soft down. After flowering the foot stalk elongates, and when the fruit is mature is 2 or 3 in. long, or longer than the petioles, and bears one or two acorns an inch long; the cup has its upper scales awn-pointed, and sometimes forming a mossy fringe around the edge. The wood is brownish, heavy, and compact; its uses are similar to those of white oak. The chestnut oak (*Q. prinus*) has given botanists much trouble on account of its variable character. The leading form is popularly known



Swamp White Oak (*Quercus bicolor*).

as the swamp chestnut oak; it has obovate or oblong leaves undulately toothed on the margin, minutely downy beneath, with 10 to 16 pairs of straight rather prominent primary ribs. The fruit-bearing stalk is shorter than the petioles; the acorn is an inch or less in length, with a thick cup covered with hard stout scales. This is found from Pennsylvania southward, and is most plentiful in the Carolinas and Georgia, inhabiting moist and dry soil, and differing much in size and the quality of its wood according to its situation. It makes durable rails. A variety of this is the rock chestnut oak (var. *monticola*), given in some works as a species (*Q. montana*); it is found in or near the mountains, from Vermont southward, and forms a tree 30 or 40 ft. high; it has large acorns, like the preceding, and more chestnut-like leaves; it produces greatly superior timber, and is highly esteemed as fuel. It is a most valuable tree for plant-

ing upon rocky hillsides, in situations which can never be cultivated. Another variety is the yellow chestnut oak (var. *acuminata*), which is the *quercus castanea* of Muhlenberg



Rock Chestnut Oak (*Quercus prinus*, var. *monticola*).

and other authors. It has leaves more like the chestnut than the others, as they are on slender petioles and oblong or lanceolate from a rounded base, equally and sharply toothed and with very straight veins. The acorns are rather small, very sweet, with a thin hemispherical cup, having appressed scales. This variety is a handsome tree 60 to 70 ft. high; it is more abundant in the middle states than northward, and extends to Florida. Its wood is very yellow, strong, and durable. Not only is there some confusion in the botanical nomenclature of oaks, but the common names are carelessly applied; in the western states the yellow chestnut oak is called chinquapin oak, a name that belongs to the variety *humilis* mentioned below. Another variety of *Q. prinus* is Michaux's oak (var. *Michauxii* of Chapman), a large tree found in low grounds from South Carolina to Florida; it has smaller and more rigid leaves than the rock chestnut oak, velvety underneath, and obtuse or slightly cordate at base, with a nut $1\frac{1}{4}$ in. long. The smallest variety of this species, the chinquapin

oak (var. *humilis*), is sometimes called the dwarf chestnut oak. It is the smallest of the northern oaks, being usually 2 or 3 ft. high, and seldom above 5 ft. Some botanists



Live Oak (*Quercus virens*).

regard this as a distinct species, and it has several different botanical names. It is found from southern New England and New York south and westward in sandy barrens, where it often forms the sole vegetation of many acres. It produces its small acorns very abundantly, and affords food for animals.—The live oak (*Q. virens*) also belongs to the annual-fruited oaks, and is distinguished from all the eastern



Live Oak Tree.

species of this section by its thick, evergreen leaves, which are entire, or in one variety with spiny teeth. Its leaves are 2 to 4 in. long, oblong, obtuse, smooth and shining above, and

as well as the branchlets hoary beneath; the fruit stalk is conspicuous, bearing one to three fruits; acorn oblong, chestnut-brown, with a top-shaped, hoary cup. This is usually a large, much-branched tree, found from Virginia to Texas, and seldom more than 50 m. inland from the coast; it also extends into Mexico and Central America, and is found in some of the West India islands. The wood of this species is yellowish, fine-grained, and of exceedingly slow growth; it is considered of greater value than any other for ship building, and is highly prized by all maritime nations; the tree usually branches low, and it therefore supplies an abundance of knees; it is also of great value to the wheelwright and the millwright. A seaside variety (var. *maritima*) has acute leaves, larger fruit, and does not exceed 10 ft. in height; and a still smaller form (var. *dentata*) is found in the pine barrens of Florida, only 1 or 2 ft. high, with the earliest leaves toothed and nearly sessile, and the fruit short-peduncled or



Willow Oak (*Quercus phellos*)

nearly sessile.—The characters of the biennial-fruited oaks have been described; these, like the annual-fruited species, are in groups, one of which is the willow oaks, which are nearly or quite evergreen at the south, their leaves generally entire, and the acorn globose. The upland willow oak (*Q. cinerea*) is a small worthless tree of the pine barrens from Virginia southward, resembling the live oak, from which it is distinguished by its narrower, more downy leaves, and its globular acorn. The willow oak (*Q. phellos*) is distinguished from all other oaks by its willow-like leaves, which are from 3 to 4 in. long, and smooth when old; the flat cup encloses the base of the hemispherical nut. It is slender, 30 to 50 ft. high, and found along swamps and streams from Long island to Florida; its timber is of little value; it is planted in some of the southern cities as a shade tree. The variety *laurifolia* is a larger tree with longer and broader leaves, and the variety

arenaria is a mere shrub with smaller leaves. The shingle oak (*Q. imbricaria*), also called the laurel oak, has lance-oblong leaves, which are smooth above and downy beneath; it grows from 30 to 50 ft. high, and is found from New Jersey south and west. Its wood, though hard, is poor; it is used for shingles in some of the western states. The water oak (*Q. aquatica*) is small and very variable, growing in wet places from Maryland to Florida; it has a smooth bark and usually wedge-shaped, smooth, and shining leaves, which are sometimes lobed and bristle-pointed; the wood is tough but not durable. Related to the preceding in the shape and variability of its foliage is the black-jack (*Q. nigra*), which grows on sandy barrens from southern New York to Florida, and westward to Illinois; it is readily distinguished by the wedge-shaped leaves, which are conspicuously broad at the summit and often bristle-pointed, shining above and rusty beneath; the cup is top-shaped, with coarse scales. This tree rarely exceeds 30 ft., and is usually much smaller; its wood is of little value save for fuel. Lea's oak (*Q. Leana*), Bartram's oak (*Q. heterophylla*), and several others, are regarded as hybrids of the preceding biennial species with others.—The black and red oaks make another group of biennial species; these all have pinnatifid or lobed, long-petioled, deciduous leaves. The smallest is the bear or black scrub oak (*Q. ilicifolia*), which is found on rocky hills and sandy plains from New England to Kentucky; it is 3 to 8 ft. high, with obovate leaves, ridge-shaped at base, about five-lobed, and abundantly downy beneath; acorn ovoid, often beautifully striped, with a deep orange kernel; as it produces a great number of scraggy branches, it has been suggested as a



Bear or Black Scrub Oak (*Quercus ilicifolia*).

hedge plant for poor lands. The Spanish oak (*Q. falcata*) was so called by the Spanish settlers in the south from its resemblance to the common oak of Spain; it is distinguished by

the falcate or scythe-shaped lobes of its leaves, which are grayish or yellowish-downy beneath; it is found in dry localities from New Jersey to Florida and to Illinois; when growing alone it is very handsome, sometimes 80 ft. high; its wood is porous and unfit for barrels to contain liquids, but is sometimes used for felloes; its bark is valuable for tanning, and is said to color the leather less than that of any other oak. The remainder of this group have their much-lobed, usually ovate leaves smooth on both sides, and turning some shade of red in autumn. The Turkey or pine-barrens scrub oak (*Q. Catesbæi*) grows in North Carolina and southward, on land too poor to sustain any other vegetation; it has thicker leaves than any others of this group, and a thick cup with coarse scales; it is small and of no value save for fuel. —The scarlet oak (*Q. coccinea*) is one of the commonest species, and is found, usually in dry soil, over a wide range from north to south; it is, except northward, large and handsome, with leaves deeply pinnatifid, and the lobes often toothed, bright green, shining, and in autumn turning to a beautiful scarlet; the acorn is about three fourths of an inch long, more than half covered by the coarsely scaly cup; the scar of



Scarlet Oak (*Quercus coccinea*).

the acorn within the cup as well as its flesh is white or yellowish. The black, quercitron, or yellow-barked oak, formerly regarded as a species, is now placed as var. *tinctoria* of the preceding. Although extreme forms are readily distinguished by differences in the leaves and fruit, yet in many cases it is impossible to decide whether a specimen is a scarlet or a black oak without cutting into the bark, which in the latter is much thicker, and orange-colored within; the kernel of the acorn is yellowish, and its seat within the cup is orange-colored; in autumn the foliage turns a rich yellowish brown, russet, orange, or dull red. While the wood of the species is of little value even for fuel, that of the variety is second only to white

oak, and much used by ship builders and wagon makers. The bark contains much tannin and an abundant coloring matter; it is valuable for tanning and dyeing, for which use large quantities are yearly exported. (See QUERCITRON.) There are other forms of the scarlet oak, probably hybrids. The red oak (*Q. rubra*) has an equally wide range with the scarlet and black oaks, and extends further north than any other; it has less deeply lobed leaves, which turn to a dark red before they fall, and the acorn cup is broader and shallower. Its wood is of little value for timber or fuel, but the tree itself is very ornamental. —In the states on the Pacific coast each of the groups here mentioned is represented either by species peculiar to those regions, or by forms so like the eastern species that botanists regard them as varieties; the oaks there are even more variable than those of the Atlantic coast, and as each botanist who has studied them has come to different conclusions from his predecessors, the subject is somewhat confused, and only a few of the more striking species will be mentioned. Garry's oak (*Q. Garryana*) is found from Washington territory southward to California, varying in height from 30 to 80 ft.; it belongs to the same group with the white oaks, and has the under side of the leaves covered with a dense dingy down; it branches low down, and at a distance a grove of it looks like an apple orchard; this is one of the species of which the nuts are gathered for food by the Indians, and its wood is considered nearly equal to that of the white oak for ship building. Another of the white oak group is *Q. lobata*, given in the various reports as *Q. Hindsii*, though the former is the older name; this is regarded as the finest species on the Pacific coast, and one of the most abundant; it has a thick and rough bark, leaves shaped much like those of our white oak, and acorns often 2 in. long and pointed, but varying in this respect. It often reaches a diameter of 6 to 8 ft. and a height of 50 to 75 ft., with wide-spreading branches; the wood is brittle and porous, and the nut edible. Douglas's oak (*Q. Douglasii*) is smaller, but very difficult to distinguish from some forms of the preceding. The chestnut oak of California is *Q. densiflora*, and an evergreen; it is a small handsome tree of the foot hills south of San Francisco; its foliage is very variable, being sometimes entire, but often toothed like that of the chestnut, its resemblance to that tree being carried out in the acorn cup, which is densely covered with long spreading scales and appears much like a chestnut burr. Another evergreen species is *Q. chrysolepis*, which upon the Sierra Nevada is a mere shrub, but on the foot hills is 40 ft. high, with usually entire leaves, yellowish downy beneath; the acorn is about an inch long, with a remarkably thick and velvety cup, on account of which Torrey called it *Q. crassipocula*, and from its yellowish pubescence it was named *Q. fulvescens* by Kellogg, both of which names are more

recent than that here adopted. The variable tree known in California as the scrub or evergreen oak is *Q. agrifolia*, which extends from the valley of the Sacramento to the Mexican



California Evergreen Oak (*Quercus agrifolia*).

border; it is, according to locality, a large shrub or a tree 30 or 40 ft. high; its leaves, which are as variable as in the other species, are often sharply toothed, and the acorns elongated, acute, and sometimes very narrow, like a cockspur.—The European or British oak, or royal oak as it is often called, appears to vary quite as much as some of our species, different forms having been described as distinct species, and botanists are not agreed in regard to one of the commonest and most important European plants. Hooker and Bentham make but one species, *Q. robur*, and place what others call



European Oak (*Quercus robur*).
1. Var. *sessiliflora*. 2. Var. *pedunculata*.

Q. sessiliflora and *Q. pedunculata* as varieties of this, with the same names for the varieties as others give to the species. *Q. robur* is found over the whole of Europe except at the extreme

north, and extends into Asia along the Caucasus; it is the oak of poetry and history, and is one of the stateliest and longest-lived of the genus. It belongs to the same section with our white oaks, but has smaller leaves, which are not whitened beneath, and they are not deeply lobed; the oblong acorn is over an inch long, in a short cup which is covered with short, obtuse, closely imbricated scales. In the variety *sessiliflora* the fruits are solitary or few in a cluster, nearly sessile in the axils of the leaves, which have petioles half an inch to an inch long, while in the variety *pedunculata* the fruits are clustered above the middle of a slender stalk, which varies from 1 to even 6 in. long; the leaves vary from sessile to short-petioled. The first named is more abundant in North Wales and the hilly portions of northern England, while the other is the commonest over the greater part of England and the lowlands of Scotland. In durability the timber of the two varieties is regarded as equal; but as that of the pedunculate oak shows more of the silver grain, it is more valuable for cabinet work than the other. Each of these varieties has a dozen or more sub-varieties, marked by a distinct habit of growth or some striking form of foliage, which are made use of in ornamental planting. Some of the oaks now standing in England were old trees at the time of the conquest, and their remains so long as they retain any vitality are cherished with reverent care. This oak succeeds remarkably in the United States, and to judge from the size of the older specimens now growing, it will after some centuries become even larger than in its native country. The Turkey oak (*Q. cerris*), a native of the southern parts of Europe, succeeds well in this country; its short-petioled leaves are deeply and unequally pinnated, and downy beneath; the cup of the acorn is covered with bristly scales, on which account it is often called in England the mossy-cup oak. This has also produced several varieties, some of singular beauty; some are very spreading, and others are almost evergreen even in America, holding their foliage nearly to Christmas. The timber of the Turkey oak is regarded as equal in value to that of the British oak. The common evergreen species of Europe is the holm or holly oak (*Q. ilex*), abundant in the southern countries, especially in Italy and Spain, and extends to northern Africa and to Asia; it grows naturally on hilly ground near the sea, and in England has been found to grow upon the seashore where no other oak will live. It is a low or middle-sized tree, and is furnished with branches down to the ground, but if pruned may be made to grow much taller with a clean trunk; its leaves are thick, and either entire or toothed like those of the holly; its wood is brown at the heart, fine-grained, hard, tough, elastic, and remarkably heavy, and greatly esteemed for ship building. It is a long-lived tree, and is the oak of Pliny and

the early historians. In England it is used in ornamental planting and for screens; it is not hardy in our northern states.—The acorns of several Californian species furnish a large share



Valonia Oak (*Quercus agrifolia*).

of the winter food of the Indians of the western coast. They are powdered in a mortar, and the meal, after washing it to remove the bitterness, is made into cakes or mush. An evergreen species, *Q. ballota*, abundant in Algeria and Morocco, has large nuts which are eaten raw or roasted. The acorns of the Gramont oak (*Q. Gramuntia*) of Spain, when in perfection, are regarded as even superior to chestnuts, and are much eaten. Besides the use of the bark in tanning (see LEATHER), a secondary one is of some importance in horticulture; a mass of the spent tan bark gradually ferments and gives off a mild heat, which, though more gentle than that from manure, is long continued and especially adapted to some plants, particularly the pineapple. In the valonia oak (*Q. agrifolia*) of the Grecian islands and throughout Greece, the tannin is so abundantly secreted in the acorn cups that these form an article of commerce under the name of valonia; the tree is large, with foliage much like that of our chestnut oaks, and large acorns, the cups of which are about 2 in. across, hemispherical, and clothed with large reflexed woody scales. Two varieties are also known in commerce: *camata*, which is the half-grown acorns dried in their cups, and *camatina*, which is the undeveloped acorns gathered soon after flowering when about the size of large peas; these last are much richer in tannin than the other two. Besides the yellow dye of the quercitron oak, a crimson one is furnished by *Q. coccifera*, found in the Levant; its leaves are much infested by a scale insect, a species of coccus, which when it has completed its growth has every appearance of a berry, and is known as kermes. (See COCHINEAL.) The oak manna of Kurdistan, usually ascribed to *Q. mannifera*, is, according to Haussknecht, afforded by *Q. vallonea* and *Q. Persica*; the twigs are visited by myriads of a small white coccus, and from the punctures made by these exudes a saccharine fluid which solidifies in small grains; this is collected by the wandering tribes, who use

it as a substitute for sugar.—Oaks form very long perpendicular tap roots, and in cultivation when the plants are a year old they should be transplanted, and at the same time the tap root be shortened; by frequent transplanting thereafter, trees may be obtained with a good share of small roots, and such may be removed without difficulty. In planting for timber or for ornament, except in streets, the surer way is to put in several acorns where the trees are to stand, and when the plants are two or three years old remove all but one. Although so hardy and robust when old, the oak is exceedingly tender during its first few years; and in England it is customary to provide “nurse trees,” which shade and protect the oaks until they become thoroughly established.—There are many fine oaks in Japan and northern China, as well as in the mountainous parts of Mexico and the Himalayas.

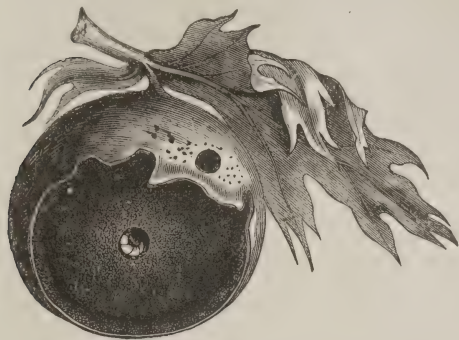
OAK APPLE, the popular name applied to certain large excrescences or galls found upon the leaf, stems, or tender twigs of different oaks, produced by the action of insects. The oak apple of Europe, to which the term more particularly applies, is an object familiar to every English school boy, and is produced by *cynips terminalis*. It is of the size of an ordinary apple, and is found quite commonly about Easter time on the tender shoots and twigs of the common European oak (*quercus robur*). At this time it presents the appearance of an ordinary codling that has been roasted, being of a pale, dingy buff color, of spongy consistence, and having an irregular and wrinkled surface. The American oak apple, which is



Gall Fly magnified. The lines below show the natural length of body and wings.

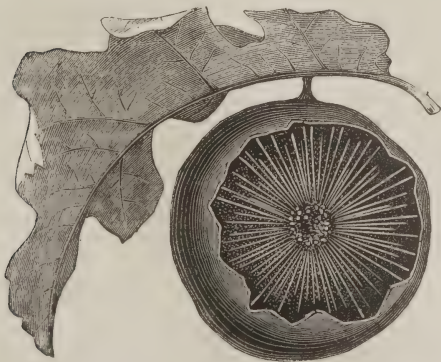
its analogue, is produced on the leaf stem of the black oak (*Q. tinctoria*) by *cynips q. spongifica*. In both these instances the gall is produced in the same manner as the well known gall nut of commerce. (See GALLS.) With her ovipositor, admirably adapted to the purpose, the female pierces the plant tissues, and therein consigns an egg, together with a small quantity of a peculiar poisonous fluid. Under the influence of this fluid the gall rapidly develops, and is generally fully formed before the egg hatches. The egg is whitish in color and soft. It invariably swells more or less by endosmosis of the surrounding juices, and the outer pellicle is so delicate that no shell is

left in hatching; but the larva, or young gall insect, seems rather to be gradually transformed from the egg. This larva is whitish, very soft, and has an inconspicuous head and



American Oak Apple, showing internal structure, the grub in the central cell, and the hole on the side through which the perfect fly issues.

no legs. The body is more or less cylindrical, tapering to both ends, but more especially behind, and lies in a curved position within its cell. As the larva grows the gall substance around its cell hardens into a cream- or buff-colored shell, which partially separates from its surroundings. This separation may perhaps be in part explained by the absorption of digested matter, as no faeces are found in the cavity, and, if excreted and absorbed, they would naturally cause increased hardening, and lessen the influence of the plant immediately around the cavity. The pupa state is gradually assumed, and the fly attains perfection and remains in its cell for some time before eating its way out to liberty through the walls of its gall; all the transformations being less sudden than in the majority of insects, on account of the delicacy of the successive skins to be thrown off. The American oak apple begins to develop as



Bastard Oak Apple.

soon as the leaves put forth in spring, and when mature has a shiny, rather smooth, dingy buff-colored exterior, the space between the central cell and the external rind being filled with a

drab-colored spongy mass, which becomes more solid and paler toward the centre. The insects issuing from this gall in early summer are of both sexes, and have been described as *cynips q. spongifica*; those issuing from it in the fall, and which have been described as *C. q. aciculata*, are larger and otherwise different, and are all females.—There is another large gall found exclusively on the red oak (*Q. rubra*), which is called the bastard oak apple. It differs from the genuine American oak apple in having the central cell connected with the rind by slender radiating filaments instead of spongy matter. The insects produced from this gall, and described as *cynips q. inanis*, are undistinguishable from the bisexual flies produced in early summer from the genuine American oak apple; a fact of great biological significance, which indicates that these galls, though so very different in structure, may be specifically related.—These oak apples are (as are indeed all galls) the result of the combined action of an animal and a vegetal organism, and must necessarily cease to exist if either of the organisms which coöperate to produce them were swept from existence; yet the study of galls belongs to the entomologist rather than to the botanist, and those of this country have been investigated especially by Baron Osten-Sacken, H. F. Bassett, Prof. C. V. Riley, and the late Dr. Harris and Mr. B. D. Walsh, whose discoveries present some of the most remarkable facts in insect biology, and afford striking examples of dimorphism, of parthenogenesis, and of alternation in generation. Not all the insects found in oak apples are gall flies; parasitic insects deposit their eggs in the forming apple, and their larvae live at the expense of the grub of the true gall maker. Several species, called *inquilines*, devour the gall substance at the peril of the young of the true architect; while others take possession of the old and deserted galls.

OAKELEY, Frederick, an English clergyman, born in Shrewsbury, Sept. 5, 1802. He graduated at Oxford in 1824, became prebendary of Lichfield in 1832, chaplain to Lord Stanhope in 1834, and Whitehall preacher for Oxford in 1837. In 1845 he became a Roman Catholic, and in due time was ordained priest and appointed missionary rector of St. John's, Islington, and in 1852 canon of Westminster. Among his numerous works are: "Whitehall Sermons" (1839); "A Letter on submitting to the Catholic Church" (1845); "Practical Sermons" (1848); "Order and Ceremonial of the Most Holy and Adorable Sacrifice of the Mass" (1848; 2d ed., 1859; translated into Italian); "The Church of the Bible" (1857); "Historical Notes on the Tractarian Movement, A. D. 1833-'45" (1865); "Letters on Dr. Pusey's Eirenicon" (1866); "Lyra Liturgica" (1867); and "The Priest on the Mission" (1871).

OAKES, John Wright. See supplement.

OAKLAND, a S. E. county of Michigan, drained by branches of the Clinton and Huron riv-

ers and other streams; area, 900 sq. m.; pop. in 1870, 40,876. The surface is undulating and in the north hilly, and the soil is generally fertile and well cultivated. About 50 small lakes are scattered over the surface. The Detroit and Milwaukee and the Flint and Père Marquette railroads pass through it. The chief productions in 1870 were 1,142,623 bushels of wheat, 1,143,443 of Indian corn, 752,359 of oats, 133,867 of barley, 42,588 of buckwheat, 707,936 of potatoes, 1,654,621 lbs. of butter, 703,876 of wool, 81,300 of hops, and 79,709 tons of hay. There were 12,991 horses, 13,668 milch cows, 14,110 other cattle, 162,852 sheep, and 19,873 swine; 8 manufactories of agricultural implements, 29 of carriages and wagons, 6 of plaster, 14 of saddlery and harness, 5 of sash, doors, and blinds, 11 of cooperage, 7 of tin, copper, and sheet-iron ware, 4 of woollen goods, 12 iron foundries, 23 flour mills, and 3 saw mills. Capital, Pontiac.

OAKLAND, a city of Alameda co., California, on the E. shore of San Francisco bay, here 7 m. wide, opposite San Francisco, at the terminus of the Central Pacific railroad; pop. in 1860, 1,549; in 1870, 10,500; in 1875, about 22,000. It occupies a beautiful site, and derives its name from a grove of evergreen oaks in which it was originally built, but beyond which it has now expanded. The streets are broad, well shaded, sewered, and lighted with gas, and water is supplied from a creek 5 m. distant. In the vicinity are charming drives. Oakland is a favorite residence of persons doing business in San Francisco, and is much resorted to from that city for its drives and fine scenery. At Berkeley, 4 m. N., is the university of California. The state institution for the deaf, dumb, and blind, near by, was burned in January, 1875. San Antonio creek, a small bay or estuary on the S. front of the city, forms a good harbor, but it is obstructed by a bar at its mouth, preventing the passage of large vessels at low tide. The western water front is shallow, and here a pier, along which the Central Pacific railroad runs to connect with the ferry steamers for San Francisco, projects for 2 m. into the bay. Besides railroad tracks, this pier contains a broad carriageway, a passenger depot, warehouses, &c., and has three large docks. Oakland has three savings banks, with a joint capital of \$3,000,000; graded public schools, including a high school, with an average attendance of 3,000 pupils; three daily and three weekly newspapers, and 15 churches. It is the seat of the Pacific theological seminary (Congregational), organized in 1866, and having in 1873-4 7 instructors, 13 students, and two libraries of 3,500 volumes each. Oakland was incorporated as a city in 1854.

OASIS, a name given by the ancients to the fertile spots in the Libyan desert, and now become a general term for those situated in any desert. It is derived from an Egyptian word preserved in the Coptic *uah*, and signifying an inhabited place, as there the caravans halted

in their journeys between eastern and western Africa. Anciently they were supposed to be islands, rising from an ocean of sand; but generally they are depressions in the midst of a table land resting on a bed of limestone, whose precipitous sides encircle the hollow plain, in the centre of which is a stratum of sand and clay, retaining the water flowing from the surrounding cliffs. On the cultivated portions date palms, rice, barley, wheat, and millet are cultivated. The Libyan oases were never permanently occupied until after the conquest of Egypt by the Persians. Under the Ptolemies and the Cæsars they were occupied by Greeks and Romans, and were places of banishment for state criminals; later they were places of refuge from persecution. In the Sahara desert upward of 30 oases are enumerated, of which about 20 are inhabited. The most celebrated are the following, all in the Libyan desert. 1. Ammonium, the modern Siwah, the most remote from the Nile, in lat. 29° N., lon. 26° E., contains the ruins of the temple of Ammon, and the supposed "Fountain of the Sun," whose waters were warm in the morning and evening and cold at midday. This oasis is remarkable for the productiveness of the soil, which is strongly impregnated with salt. It has several towns, the principal of which is Siwah el-Kebir, and its inhabitants are subjects of Egypt. (See SIWAH.) 2. Oasis Minor, the modern Bahryeh, is S. E. of Siwah, in lat. 28° 30' N., and contains temples and tombs belonging to the era of the Ptolemies. It was also under the government of the Romans, and was then distinguished for its wheat; but now it produces principally fruits. 3. Oasis Trinytheos, the modern Dakhel, in lat. 25° 30' W. of ancient Thebes. The earliest monuments are those of the Romans, and there are artesian wells. 4. Oasis Magna, the modern Khargeh, S. E. of the preceding, and S. W. of Thebes, is about 90 m. W. of the Nile, with which it is parallel. It is about 80 m. long and 10 m. broad, stretching from lat. 25° to 26° N. It is sometimes called the oasis of Thebes; by Josephus it is denominated "the Oasis," and by Herodotus "the city Oasis" and the "island of the blessed." It had a temple 468 ft. long, dedicated to Amun-ra, and after the Christian era abounded in churches and monasteries. There are in the Libyan desert several other oases of considerable importance, among them Augila, S. of Barca, and Farafrah, between Siwah and Dakhel, in lat. 27°. Farafrah was visited by Rohlfs in December, 1873, and Dakhel in the following January. Many oases contain stagnant lakes, from which feverish exhalations arise.

OAT (Ang. Sax. *ata*, a word which formerly meant food), a grass of the genus *avena*, and especially the cultivated *avena sativa*, the common oat. The genus, which is the type of a sub-tribe of grasses, the *avenae*, has a parded inflorescence, with its spikelets several-flowered, the glumes large and exceeding the

florets; the lower palet many-nerved, two-cleft at the acute tip, and bearing a long, usually bent or twisted awn on the back below the cleft; grain oblong-linear, grooved on one side, hairy at the top, or sometimes entirely, surrounded by the upper palet, but not adherent to it. The cultivated oat is an annual, but the genus contains perennial species. As with other cereals, the wild state of the cultivated oat is not known, though it is not unlikely that it is a form of the wild oat produced by cultivation. The oat is especially a northern grain, reaching its greatest perfection in cold climates, and in southern countries rapidly degenerating. The heavy seed brought from the north of England and Scotland to this country gives a much lighter grain than the original. The legal bushel of oats in the different states and territories varies from 30 to 35 lbs., the majority having it fixed at 32 lbs.; some of the imported oats weigh from 40 to 50 lbs. the measured bushel. The varieties are numerous, but seedsmen do not offer more than half a dozen. There are white and black varieties, and those with and without awns. A very popular variety in both England and this country is the potato oat, a large, plump, white grain, so called because it was derived from a stalk found in a potato field; the black Poland is another esteemed variety, and new ones are offered every year. Oats succeed on a great diversity of soils, and in this country they need to be sowed as early as the ground can be worked, that their growth may not be checked by hot weather; from two to four bushels of seed are sown to the acre, and the crop is harvested when the grain has passed the milk state. Oats are more generally used as food for animals in this country than in any other. They consist of 22 to 28 per cent. of husk; the larger and plumper the grain, the less refuse. Deprived of their integuments, oats are called groats or grits, and the Embden and other groats are the same crushed to various degrees of fineness. Oat meal is prepared by grinding the kiln-dried grain; its composition, as determined by Letheby, is: nitrogenous matter, 12.6; carbohydrates, 63.8; fatty matter, 5.6; mineral matter, 3; water, 15. Oats are regarded as less nutritive than wheat, but their content of nitrogenous principles is rather larger and of carbonaceous somewhat less than in that grain. The skinless oat, a different species from the common one, is *A. nuda* of Europe; it has narrower and somewhat roughish leaves, three or four florets in each spikelet, and the grain quite loose in the upper palet. This is much esteemed in Ireland and some other parts of Europe, but its culture has not been successful in this country, and the same may be said of other real or supposed species. The entire production of oats in the United States returned by the census of 1870 was 282,107,157 bushels. The states producing more than 5,000,000 bushels each were as follows: Illinois, 42,780,851 bushels; Pennsylvania, 36,478,585;

New York, 35,293,625; Ohio, 25,347,549; Iowa, 21,005,142; Wisconsin, 20,180,016; Missouri, 16,578,313; Minnesota, 10,678,261; Michigan, 8,954,466; Indiana, 8,590,409; Virginia, 6,857,555; and Kentucky, 6,620,103.

—The wild oat of Europe and that of California are the same, *A. fatua*; this has a very loose panicle, with the inner palet and also the grain clothed with long stiff hairs, especially toward the base, and the outer palet also hairy with a stout awn, twice its own length, bent about the middle and twisted near the base; the hairy florets with long awns have the appearance of an insect.



Wild Oat (*Avena fatua*).

This oat occurs in all parts of Europe as a weed in cultivated fields, and in California it occupies wide tracts of country to the exclusion of other plants, and plays an important part in agriculture. It is of little value for its grain, but when cut before it has begun to ripen it makes valuable hay. The experiments of Prof. J. Buckman at the royal agricultural college, England, show that this may be the original of the cultivated oat; he found that seeds of this gathered when ripe, and sown the next spring, produced plants bearing grain different from those from self-sown seeds; and by continuing this and carefully selecting he in a few years produced grain undistinguishable from that of some cultivated varieties.—The animated oat (*A. sterilis*) is a native of Barbary, and its seeds are sold by the seedsmen; it has remarkably long, strong, and much twisted awns, bent at right angles. The two-flowered spikelets show two awns and appear wonderfully like an insect. The awns are exceedingly hygrometric, and with the changes of moisture in the atmosphere twist and untwist; when the seed falls and comes in contact with the moist earth, it is enabled to travel quite a distance by the propulsion given to it by the twisting and untwisting of the awns. If a spikelet of this oat be moistened and laid upon a table, its motions are so life-like as to cause great amusement. Several years ago so-called barometers were sold in which a hand attached to an awn of this oat was moved to point to "rainy," "clear," &c.; but of course it was not a barometer, but only a poor hygrometer.—About 70 species of *avena*

are enumerated, only two of which are natives of this country (*A. striata* and *A. Smithii*), and they have no economical value. *A. pratensis*, the perennial oat, and *A. flavescens*, the yellow oat, are common in the pastures of Europe. Oat grass (*arrhenatherum avenaceum*) is much like an oat, but has its lower floret staminate only; it belongs to the same subtribe with *avena*, and was formerly called *A. elatior*. It is a native of Europe, and was introduced to our farmers 50 years ago with the absurd name of Andes grass; it is again receiving the attention of farmers.

OATES, Titus, the contriver of the "popish plot," born in England about 1620, died in London, July 23, 1705. He was the son of a clergyman, was educated at Cambridge, took orders, and held several curacies, but lost them by committing perjury in two malicious prosecutions. Subsequently he was dismissed in disgrace from a chaplaincy in the navy. With a Dr. Tonge, Teonge, or Tongue, he concocted a plan for informing against Roman Catholics, in regard to whom there was a strong popular feeling of distrust. In 1677 he professed to be a Catholic, but was successively expelled from the Jesuit colleges at Valladolid and St. Omer. He returned to England in June, 1678, and drew up a narrative of a Jesuit conspiracy to murder the king and subvert the Protestant religion. Tonge laid it before the king, who paid no attention to it. Nevertheless Oates enlarged the story until it comprehended a vast scheme for the seizing of the kingdom by the Jesuits, and implicated all the principal Catholic gentlemen in England, and even the queen; and he swore to the truth of it before Sir Edmondbury Godfrey. A warrant was issued for seizing persons and papers, but the only evidence found was the expression in the papers of the duchess of York's secretary of a hope for the speedy reestablishment of the Catholic religion. Within a month Sir Edmondbury Godfrey died, whether by murder or suicide was unknown, and a great demonstration was made at his funeral. Thence arose an excitement such as had never been known in London, in which both government and people seemed to lose their senses. Catholics were arrested and their houses searched, Whitehall was fortified, the streets were patrolled, and popish assassins were supposed to be lurking in every shadow. Oates was lodged in Whitehall, had guards assigned him, and received a pension of £1,200 per annum. The party opposed to the court used the plot for political purposes, and the court has been strongly suspected of getting it up for its own. In November, 1678, the trials of the accused Catholics began; and numbers of them were convicted, amid the applause of the populace. At the end of two years the bad character of Oates and the improbability of his story began to be considered; and when Lord Stafford was executed for complicity in the plot, in December, 1680, public feeling began to turn. In a civil

suit for defamation brought against Oates by the duke of York, the jury gave £100,000 damages, and Oates was imprisoned as a debtor. Soon after the accession of James II., in 1685, he was convicted of perjury on two indictments, and was sentenced to pay a fine of 2,000 marks, and to be pilloried, whipped, imprisoned for life, and pilloried five times a year in different parts of the kingdom. He was nearly killed in the first pillory, and his partisans raised a riot for his rescue. At the whipping he received 1,700 blows, and had to be drawn away on a sledge. Yet he survived it all, and on the accession of William of Orange his sentence was annulled, and he afterward received a pension of £5 a week.

OATH, a solemn act by which one calls God to witness the truth of an affirmation or the sincerity of a promise. In all times and among all nations men have agreed in reposing singular trust in declarations made under such a sanction. In primitive and in all purer states of society, solemn oaths, it would seem, have been universally taken in the name of superior beings. Among the Jews, the Greeks, and the Romans there came to be a familiar distinction between their greater and their lesser oaths. The same is probably true of other nations. The less solemn forms of adjuration included oaths by sacred objects, or by things peculiarly dear to those who employed them. Thus, the Jews swore by Jerusalem and by the temple; the Greeks as well as the Romans by the souls of the dead, by the ashes of their fathers, by their life or the lives of their friends, by their heads, and their right hands. These forms had their origin partly too, perhaps, in the custom of touching, during the recital of the usual formula, some object sacred to or suggestive of the divinity invoked; so that, as during the administration of the oath the swearer laid his hand upon a crucifix as a sacred symbol, or touched the altar while he swore by the God in whose honor it was raised, he came at last to swear not by the divinity, but by the altar or the "good rod" itself. When the Jew took his most solemn oath, he laid his hand upon the book of the law and swore by the God of Israel; but the ordinary oaths were by heaven, the altar, or the temple. Public oaths were administered in Athens in the names of Jupiter, Neptune, and Minerva; purgatory oaths were taken in the names of Jupiter, Neptune, and Themis; and judges swore by Jupiter, Ceres, and Helios. Numa commanded the Romans to swear by Fides. After the murder of Cæsar, the senate decreed that the citizens should swear by his genius. It was subsequently common to swear by the majesty or by the life or welfare of the emperor. The ancient Scandinavians and Germans swore by their gods. Among both races it was customary, while repeating the oath, to rest the hand on some special object. This was sometimes significant of the god addressed, and sometimes reminded the swearer of the punishment which

followed perjury. The Scandinavians touched a bloody ring held by the priest. The Germans swore by their swords or beards. In early Christian times oaths were administered in chapels and other holy places, at the altars, which for the occasion were rendered more sacred by placing upon them holy relics. In modern times the Germans have sworn by God, and sometimes also by the holy evangel. Roman Catholics add an invocation of the saints. —It is sometimes laid down that in the definition of an oath two things are to be distinguished: 1, the invocation by which God is called to witness the truth of what is sworn; and 2, the imprecation by which God is called on to punish falsehood. But many writers of authority define an oath without any mention of imprecation. Thus Cicero speaks of an oath as an affirmation under the sanction of religion; and more explicitly Voet, in his "Commentaries upon the Pandects," writes that it is a religious affirmation of the truth, or an invocation of the name of God in witness of the truth. A Spanish jurist, Perez, defines an oath as an affirmation on any subject by the name of God and some sacred thing; and the author of Fleta as the affirmation or negation of some point confirmed by the attestation of a holy thing. Coke uses similar language to these. As a witness in taking an oath must be understood to make a formal and solemn appeal to the Supreme Being for the truth of the evidence which he is about to give, atheists, who deny the existence of a Supreme Being, and such infidels as profess a religion which does not bind them to speak the truth, could not by the common law be witnesses. It was laid down in the leading and interesting case of *Omichund v. Barker*, that the competency of a witness in regard to his religious opinions should be tested by the questions whether he believed in a God, in the obligation of an oath, and in a future state of rewards and punishments. But it is not now required that the witness believe in future punishment. Generally a disbelief in a future state goes only to affect the credibility of the witness; but he will be admitted to testify under oath if only he believes in the existence of a God who will punish crime, it matters not whether in this life or in another. If, on being questioned, the witness reply that the usual form of the oath will be binding on his conscience, it would be irrelevant and unnecessary to examine him further as to his belief. What this may be is immaterial; for if he takes the oath, he is understood to assume its religious obligations, and subject himself to the legal penalties which are inflicted on perjury if he speak falsely. The English statute 17 and 18 Victoria, c. 25, permits those who from conscientious motives should be unwilling to take an oath, to make instead their solemn affirmation. The same indulgence is granted by statutes in the United States; and in some of the states there are even further relaxations of the ancient rules.

(See EVIDENCE.) The form of administering the oath is in every case that which most forcibly impresses on the swearer the obligation of the oath, or in other words is most binding on his conscience. Jews are sworn therefore on the Pentateuch, Mohammedans on the Koran, and those of other faiths with such forms or ceremonies as they may deem most binding.—Of the various kinds of oaths, the promissory, assertory, decisory, and *calumniæ causa* are most frequently met with. Promissory oaths refer to future acts, like those taken by public officers for the guaranty of their faithful performance of official duties; or they attend the promise to execute some contract or undertaking. Assertory or affirmative oaths establish the certainty of a present or past fact. To this class belong the various forms of decisory oaths; for example, the voluntary, when, as in the civil law, one asserts the justice of his claim; or the necessary, when the judge calls in one of the contesting parties to swear to a matter doubtful to him, in order to assist his determination of the cause. But the decisory oath by excellence is perhaps that in the civil law, which one party offers to the other, for the decision of the matter in dispute; that is to say, a party whose proof is defective may tender an oath to his adversary, offering to submit to whatever he shall thus declare touching the matter. If the fact in question lie particularly within the knowledge of the latter, he must swear, or the plaintiff's general allegations will be regarded as proved. If the fact lie within the knowledge of both parties, he to whose oath it was referred may elect either to swear or to refer the matter back to the party who first tendered the oath. If he refuse to do either, the fact alleged is held to be confessed and proved. In the Roman system, when an action was brought, either party must, at the other's request, take an oath that he did not maintain or defend the cause *calumniæ causa*; that is, for the mere sake of harassing his opponent. If the party challenged took the oath, the other could bring no action against him for reckless litigation. Before Justinian this procedure was optional, but he made it a necessary preliminary to bringing or defending any action.—Extra-judicial oaths, that is to say, those which are taken without authority of law, as for instance by members of secret voluntary associations, are possessed of no legal force whatever, and their falsity subjects the party taking them to no penalties. The taking of such oaths, however, is sometimes made a statutory misdemeanor.

OAXACA. See OAJACA.

OBADIAH, the fourth in order of arrangement of the minor Hebrew prophets, who lived probably at the time of the Babylonish captivity, prophesying about 588 B. C., though another opinion gives him an earlier date. The book of Obadiah is the shortest in the Old Testament, containing a single chapter of 21

verses. It speaks of the capture of Jerusalem, and denounces the Edomites for their enmity. It is like an amplification of the last five verses of the book of Amos, which it follows in the Hebrew canon.—A special commentary on Obadiah was published by Caspari (Leipsic, 1842).

OBELISK. See supplement.

OBBER-AMMERGAU, a village of Upper Bavaria, in the valley of the Ammer, 46 m. S. W. of Munich; pop. about 1,100, who are chiefly engaged in carving on wood. It is celebrated for the decennial performance on 12 consecutive Sundays, in the summer season, of a play representing the passion and death of Christ, in which 350 actors are employed, besides 80 members of the orchestra and chorus, all selected from the villagers, several of whom display great dramatic power and genius. The performances generally last from 8 A. M. to 4 P. M. A considerable portion of the space allotted to the theatre is uncovered. There is room for from 5,000 to 6,000 spectators, but the attendance is generally much larger, including visitors from foreign countries. The performance in 1870, interrupted by the Franco-German war, was resumed in 1871. It is the only important passion or miracle play which continues to be performed. It originated in a vow taken by the population in 1634 to perform it every ten years, in the event of their escaping from the plague which then prevailed.—See *Das Passionspiel in Oberammergau*, by Devrient (Leipsic, 1851); *Das Ammergauer Passionspiel im Jahre 1870*, by Holland (Münster, 1870); and "The Homes of Ober-Ammergau," with etchings and notes, by Eliza Greetorex (New York, 1873).

OBERLIN, a village of Lorain co., Ohio, on the Lake Shore and Michigan Southern railroad, 105 m. N. N. E. of Columbus, and 34 m. by rail W. S. W. of Cleveland; pop. in 1870, 2,888. It is principally noted as the seat of Oberlin college, founded in 1833 and named after J. F. Oberlin. This institution, under the direction of the Evangelical Congregationalists, admits students without distinction of sex or color, occupies eight commodious buildings, and has a library of 12,000 volumes. It embraces theological, college (classical), scientific, ladies', classical preparatory, and English preparatory departments, and a conservatory of music. The number of students in the theological department in 1874-'5 was 39; college, 159; scientific, 62; ladies', 170; classical preparatory, 210; English preparatory, 481; conservatory of music, 347; total, deducting repetitions, 1,830 (697 males and 633 females). The whole number of instructors was 33. In the theological department tuition and room rent are free. The number of alumni of the college is 719; theological department, 295; scientific department, 2; ladies' department, 572. The village has a national bank, several manufactories, a weekly newspaper, and five churches.

OBERLIN, Jean Frédéric, a French philanthropist, born in Strasburg, Aug. 31, 1740, died at

Waldbach, in the Steinthal (Ban de la Roche), June 1, 1826. He was educated at Strasburg, was for seven years a private tutor, and in 1767 became pastor of the poverty-stricken villages in the Steinthal, Alsace. The result of his 60 years' labor there was, that good roads, bridges, and dwellings were constructed, fine schools and comfortable hospitals established, and the agricultural products of the district greatly improved and increased, while the moral condition of the inhabitants was equally advanced. One of the many biographies of Oberlin is by H. Ware, jr. (Boston, 1845).

OBI, or **Ob**, a river of Siberia, formed, at about lat. 52° N., lon. 85° 20' E., by the junction of the Katunya and Biya, which rise in the Altai mountains. It pursues a circuitous but generally N. W. course to about lat. 61°, where it is joined by the Irtysh from the south, whence it runs N. W. and N. to Obdorsk, lat. 66° 40', where it separates and flows E. into the gulf of Obi by three mouths after a course of about 3,000 m., including its head waters. Besides the Irtysh, which after receiving the Tobol is larger than the river into which it flows, the principal tributaries are the Tom, Tchulim, and Vakh. Fish are abundant in all these rivers. The gulf of Obi is an inlet from the sea of Kara, which lies between Nova Zembla and the mainland. It is of irregular form, extending between lat. 66° 30' and 72° 30' N., and lon. 68° and 77° E.

OBION, a N. W. county of Tennessee, bordering on Kentucky, and intersected in the S. E. by the Obion river; area, about 500 sq. m.; pop. in 1870, 15,584, of whom 2,182 were colored. Its surface is low toward the west and elevated and undulating in the east, and the soil is fertile. The Mobile and Ohio and the Nashville, Chattanooga, and St. Louis railroads intersect it. The chief productions in 1870 were 91,139 bushels of wheat, 917,445 of Indian corn, 21,919 of oats, 26,501 of Irish and 33,607 of sweet potatoes, 227,660 lbs. of butter, 17,082 of wool, 645,937 of tobacco, and 2,256 bales of cotton. There were 3,742 horses, 1,671 mules and asses, 3,716 milch cows, 1,169 working oxen, 5,219 other cattle, 10,505 sheep, and 44,137 swine. Capital, Troy.

OBITER DICTUM (Lat., something said by the way or incidentally), in law, an opinion which a judge in deciding a cause expresses on a point not necessary to the judgment. Such an expression of opinion is usually to be avoided, as it cannot be supposed to have received from counsel or court the investigation and reflection bestowed upon the points actually involved in the case, and would consequently be likely to be more or less crude and ill-considered. It is liable to the objection, also, that it is an opinion in advance of any actual controversy presenting it, and without a hearing of such parties as may be concerned. Such an opinion, therefore, from however respectable a source, is not admitted to possess the force and be entitled to the authority of a precedent.

OBLATES (Lat. *oblatus*, offered), two congregations of priests and one of nuns in the Roman Catholic church. **I. Oblates of St. Charles**, founded in Milan by St. Charles Borromeo, archbishop of that city, in 1570, to form a body of missionaries for home work among the neglected classes. They were their founder's idea of the perfection of secular priests, working round the bishop as their head, and differing in this from the religious orders and congregations, which are independent of the bishop. They were called by St. Charles "Oblates of St. Ambrose," the name by which they continued to be known during his lifetime. He drew up their constitutions, which were revised by St. Philip Neri and St. Felix Cantalici, and approved repeatedly by the holy see. They had many establishments in Milan, Verona, and other parts of northern Italy. Diocesan congregations were formed on this model in various parts of Europe, especially the missionaries or Oblates of St. Irenæus at Lyons. In London, under the direction of Cardinal Wiseman, Dr. (afterward Archbishop) Manning and the Rev. Herbert Vaughan (afterward bishop of Salford), with five other priests, founded an establishment of Oblates of St. Charles, in St. Charles's college at Bayswater. They at present possess five houses in London, and serve four city missions. They make an "oblation" or vow of obedience to the bishop, the vow of poverty being voluntary. —Attached to the London Oblates, but distinct from them in idea and institution, is "St. Joseph's Society of the Sacred Heart for Foreign Missions," with a central house at Mill Hill, near London, and intrusted by Pius IX. with the spiritual care of the American freedmen. All missionaries educated by St. Joseph's society leave Europe for life, devoting themselves to extra-European races. They make vows of obedience, and bind themselves to practise evangelical poverty, and to go wherever sent. This society counts at present (March, 1875) 12 priests and 30 students in divinity, from men of all nations. They have three missions to blacks exclusively, in Baltimore, Charleston, and Louisville. Bishop Vaughan of Salford is the superior general. **II. Oblates of Mary Immaculate**, a society of regular clerks, founded at Aix, France, in 1815, by Charles J. E. de Mazenod, afterward bishop of Marseilles. At first they were auxiliaries to the diocesan clergy; but as their numbers increased they assumed the direction of ecclesiastical seminaries, penitentiaries, and charitable establishments, and undertook foreign missions. They were approved by Pope Leo XII., Feb. 17, 1826. They spread throughout France, Great Britain, Ireland, the British colonies, the islands of the Pacific, and the United States. Called to Canada in 1841, they immediately occupied in the extreme north and west of British America the old Jesuit missionary posts, and extended their labors to the remotest tribes. In Canada they have

several colleges, seminaries, and academies, with a constantly increasing body of priests. They also have numerous establishments in northern New York, Minnesota, Texas, and Washington territory. **III. Oblates Sisters of Providence**, a sisterhood of colored women, founded at Baltimore in 1825, by the Rev. H. Joubert, for educating colored girls, taking charge of colored orphans, and attending to the general needs of the colored population. They were approved by Gregory XVI. in 1831. Their mother house is in Baltimore.

OBLIGATION. See BOND, CHARTER, and CONTRACT.

OBOE. See HAUTBOY.

OBOLUS, a small coin of ancient Greece, one sixth of a drachm, equal in value to about 2·6 cents. In the best times of Athens it was made of silver only, but later of bronze.

OBRENOVITCH. See SERVIA.

O'BRIEN, a N. W. county of Iowa, watered by the Little Sioux river and Willow creek; area, 576 sq. m.; pop. in 1870, 715. The surface consists of rolling prairies; the soil is fertile. The Sioux City and St. Paul railroad crosses the N. W. corner. The chief productions in 1870 were 4,648 bushels of wheat, 500 of Indian corn, 8,909 of oats, and 404 of barley. The value of live stock was \$41,490. Capital, O'Brien.

O'BRIEN, William Smith, an Irish patriot, born in county Clare, Oct. 17, 1803, died in Bangor, North Wales, June 17, 1864. He was educated at Harrow and Cambridge, in 1827 entered parliament for the borough of Ennis, and in 1832 was returned for county Limerick, a constituency which he continued to represent for many years. He strenuously opposed the passage of the Irish arms act, August, 1843, and became an active member of the repeal association. In May, 1846, for refusing to serve on committees of the house, he was confined for several days. On the introduction of John O'Connell's peace resolutions into the repeal association, in July, 1846, he left that body, with the "Young Ireland" party. The French revolution of 1848 gave an ultra tone to his views, and shortly after that event he made a violent speech in the house of commons, threatening to establish a republic in Ireland. In April he accompanied a deputation sent by the "Irish Confederation" to Paris, to request aid on behalf of the "oppressed nationality of Ireland," and received abundant expressions of sympathy from Lamartine and his coadjutors, but no direct offers of assistance. Returning home in May, he aided in organizing a national convention of the Irish people, which was not permitted to assemble. In the same month he was brought to trial, together with Thomas Francis Meagher, on a charge of sedition, but escaped conviction. His zeal soon hurried him into overt acts, and in July he attempted a rising among the peasantry of Ballinagarry, which was promptly suppressed. On Aug. 5 he was arrested near Thurles and conveyed to

Dublin. He was tried at Clonmel on a charge of high treason, convicted, and sentenced to death (Oct. 9); but the sentence was commuted to transportation for life. In July, 1849, he embarked for Tasmania, and under the general pardon of 1856 he returned to Ireland. In 1859 he visited the United States, and after his return took no prominent part in public affairs. In 1861 he published a manifesto expressing his strong sympathy for the seceding states, and counselling his countrymen not to commit themselves in favor of the Union.

OBSERVANTS. See **FRANCOISCONS.**

OBSERVATORY, a place for making observations upon any great class of natural phenomena. Observatories are of three kinds: magnetical, for observing the phenomena of terrestrial magnetism; meteorological, for observing the phenomena of atmospheric changes; and astronomical, for observations of the heavenly bodies. In an astronomical observatory it is necessary that there should be a fixed support for the instruments, and exemption from tremors and atmospheric disturbances. To secure the first, the instruments are to be firmly planted on stone piers, completely isolated from the surrounding ground and from the building. To secure the second, a situation is to be chosen secluded from ways of travel and business. It is important that the locality be dry, of equable temperature, as nearly exempt as possible from fogs, clouds, &c., and screened from high winds so far as is consistent with a free view of the horizon. The instruments on which exact astronomy depends are the transit and its clock for obtaining exact time and fixing star positions, and the transit circle or the mural circle for measuring the meridian distances of stars. There are also several other principal instruments, viz.: the equatorial telescope, which can be directed to any part of the heavens; the heliometer, for taking the most difficult micrometric measurements; and the altitude and azimuth instrument, for determining the elements of a star's place. Every well equipped observatory has also a variety of lesser instruments. Barometers, psychrometers, thermometers, chronometers, &c., are important accessories. Of the more ancient instruments, the zenith sector and the mural quadrant are no longer in use, and the transit circle has now superseded the mural circle in all the leading observatories. The American method of recording observations by means of electro-magnetism introduced a novel and elegant kind of apparatus among the equipments of the observatory, and greatly increased the efficiency of the labors of the practical observer.—The first epoch of modern practical astronomy begins with the labors of Tycho Brahe at his castle of Uraniborg near Copenhagen (1580). Of the public astronomical institutions, the observatory of Copenhagen is the oldest, it having been built in 1656. The Paris observatory was built by order of Louis XIV. in 1667–'71, by Claude Perrault, the ar-

chitect of the Louvre. It was at first used by the academicians, D. Cassini, Picard, De la Hire, and others, as a place of observation, and later became the "royal observatory." In the present century it has been directed by Arago, Leverrier, Delaunay, again by Leverrier, and now by Mouchez. Other noted observatories in Paris were the *observatoire de la marine*, which was founded by De Lisle, where Messier discovered 21 comets; the observatory of the Mazarin college, where Lacaille first demonstrated the variation of the obliquity of the ecliptic; the observatory of the monastery of the Capuchins, where Lemonnier, at Bradley's request, verified his discovery of nutation, and where for 60 years he observed the moon; the observatory of Ste. Geneviève, where the comet observations of Pingré were made; the observatory of the military school, famous for the labors of D'Agelet and the two Lalandes. Outside of Paris were the observatory of Lyons, directed by Bonnet, Béraud, and Lefèvre; of Toulouse, directed by Darquier and Vidal; of Marseilles, known by the work of Silvestre, Thulis, and Pons; of Viviers, where Flaugergues' observations were made, &c. The royal observatory at Greenwich was founded in 1675, and is the most famous observatory in the world. Its directors have been Flamsteed (1675), known by his catalogues of stars; Halley (1719), who made many observations of the moon and stars, most of which have never been published; Bradley (1742), known by his grand discoveries of aberration and nutation, and by his observations at Greenwich, which serve as the base to modern astronomy; Bliss (1764); Maskelyne (1765), the best practical astronomer of his time, who first began that regular publication of the Greenwich observations which has so greatly added to the usefulness of the institution, so that, as Delambre has said, were all astronomical observations lost save those of Greenwich, these alone would suffice to reconstruct the whole edifice of astronomical science; Pond (1811), known as an excellent and indefatigable observer; and Airy (1835), the present director. The Radcliffe observatory at Oxford was founded in 1771, and Hornsby was the first Radcliffe observer. Johnson, known by his catalogue of stars made at St. Helena, and Main, by his researches on proper motions, &c., are the best known Radcliffe observers. The observatory of William Herschel (1780), at Slough near Windsor, is the spot of all the world where the most discoveries have been made. A major planet (Uranus), four satellites, five comets, 2,500 nebulae, and many double stars were first discovered and observed there. The observatories of Lord Rosse at Parsonstown, Ireland (about 1840), of Mr. Lassell near Liverpool, and again near Windsor, of Mr. Cooper, and of Hartwell House (Admiral Smyth) are the most famous of the earlier private observatories in England. On the continent, the observatory of Tycho Brahe, founded by King Frederick II. of Den-

mark on the island of Hven, near Copenhagen, is one of the most famous. It was called Uranienborg, and here were made those careful observations without which the discoveries of Kepler would have been impossible. The observatory of Hevelius in Dantzic (1641) was famous for his observations on the moon and on comets and fixed stars. The discoveries of Huygens (about 1655) made his residence at the Hague one of the famous observatories of the 17th century. Peter the Great caused an observatory to be erected in 1725 at his capital, and the French astronomer De Lisle was invited to be its director. The emperor Nicholas built another in 1839 at Pulkova, a small town 10 m. S. of St. Petersburg, on a scale of unprecedented magnificence. The cost was about \$500,000, and \$50,000 is annually appropriated from the imperial treasury for its maintenance. It is the best endowed and the most perfectly organized of all continental observatories. Attached to it are a very fine library and workshops for repairs and alterations in the instruments. Wilhelm Struve, its first director, gave a complete description of this establishment (*Description de l'observatoire astronomique centrale de Pulkova*, 2 vols. fol., St. Petersburg, 1845). This great work is still a standard one, and reference is made to it for details on the whole subject which cannot be here given. Pulkova is at present under the management of Otto Struve. The observatory at Dorpat (founded about 1811) was the scene of the elder Struve's researches in sidereal astronomy, and of the long series of observations of Mädler in the same department. The observatory of Königsberg (1813), under Bessel, became second to none during the present century for its contributions toward the improvement of every branch of astronomy. The observatory of Berlin (about 1834) is important on account of the labors of Encke. Here the planet Neptune was first seen by Dr. Galle, Sept. 23, 1846. The observatory of Palermo, under Piazzi (about 1800), was one of the most famous in the world. There a great catalogue of stars was made and the first asteroid discovered. The house of Galileo in Florence should be spoken of in this connection, though it could hardly be called an observatory, in spite of the brilliant discoveries made there (about 1610) of the satellites of Jupiter, the phases of Venus, the nature of the milky way, the rotation of the sun, &c. D. Cassini (about 1652) began a series of important labors which resulted in his being called to France by Louis XIV. (1669). The comet of 1652 was observed by him, and the rotation of Jupiter discovered (1665), that of Mars more exactly fixed, the zodiacal light first described, &c. The Bologna observatory (founded 1723) was directed by Manfredi and Zanotti; that of Milan (1760) was famous for the labors of Boscovich, Reggio, Cesaris, Oriani, and Carlini; that of Padua (1767) was known by the observations of Toaldo, Chiminello, and Santini; that of

Rome (1787) is noted for the work of De Vico and Secchi; that of Palermo (1789) has been directed by Cacciatores, and that of Naples (1812) by De Gasparis. The observatory of Turin was founded in 1820, that of Modena in 1819, and that of the capitol in Rome in 1825. Other observatories which have done noteworthy work abroad are those at the Cape of Good Hope, under Maclear and Henderson; those at Abo (Argelander), Altona (Schumacher, Petersen, Peters), Bonn (Argelander), Breslau (Galle), Brussels (Quetelet), Munich (Lamont), Gotha (Lindennau, Zach, Encke, Hansen), Vienna (Littrow, father and son), and many others. In the United States early observations were made at Harvard and Yale colleges, and by Rittenhouse (1769) in Philadelphia. The first observatory building was erected in 1836 at Williams college, Mass., by Prof. Hopkins. Two years later the Hudson observatory was organized in connection with the Western Reserve college, Ohio, under Prof. Loomis as director. About the same time the high school observatory at Philadelphia was established, which introduced a class of instruments superior to any before employed. The Cincinnati observatory was founded by the exertions of O. M. Mitchel in 1844, and to his influence more than to that of any other individual is due the impetus which American astronomy then received. The West Point observatory, under Prof. Bartlett, the naval observatory at Washington, under Capt. Gilliss, the observatory of Harvard college, the Georgetown college observatory, and others, soon followed.—For an account of the present activity of the principal astronomical institutions of the world, see the supplementary article OBSERVATORY.—Magnetic observatories have been established at various places, but most observations of this nature have been made in scientific voyages or in connection with observations of meteorological phenomena at regular astronomical observatories. The observatories of St. Petersburg, Greenwich, Kew, Munich, and others abroad, and Harvard college and Washington in this country, have prosecuted magnetic observations. The long series of observations by A. D. Bache at Girard college, Philadelphia, should be noted, as well as the magnetic survey of the United States carried on by the coast and geodetic survey. Meteorological observatories exist in all parts of the world, often in connection with astronomical observatories. (See supplement.)

OBSIDIAN AND PUMICE, two modifications of feldspathic or trachytic lava, obsidian being glassy, while pumice is a porous, fibrous, or tumefied mass. The different conditions to which the lava is subjected are the cause of the difference in the two minerals; obsidian is produced by the action of heat principally, while pumice is the effect of various external agencies, principally aqueous vapor and a certain temperature while the lava is fluid. Many obsidians when ignited swell into a mass of

pumice, which is like natural pumice in proportion to the amount of alkali in the mineral. If the obsidian is pulverized it does not swell, but merely turns brown. Obsidian heated above the point at which pumice is formed melts into a greenish mass, so that obsidian is often said to be melted pumice; but the obsidian may probably be formed without passing through the phase of pumice. The following table by Abich gives the analysis of two obsidians and two lavas: 1, obsidian from Teneriffe, sp. gr. 2·528; 2, pumice from Teneriffe, sp. gr. 2·477; 3, obsidian from Lipari, sp. gr. 2·370; 4, pumice from Lipari, sp. gr. 2·77:

CONSTITUENTS.	1.	2.	3.	4.
Silica.....	61·18	62·25	74·05	78·70
Alumina.....	19·05	16·43	12·97	12·27
Ferric oxide.....	4·22	4·26	2·73	2·31
Manganic oxide.....	0·33	0·23	.....	.....
Lime.....	0·59	0·62	0·12	0·65
Magnesia.....	0·19	0·79	0·28	0·29
Soda.....	10·63	11·25	4·15	4·52
Potash.....	3·50	2·97	5·11	4·73
Chlorine.....	0·30	0·53	0·31	0·31
Water.....	0·04		0·22	1·22
Total.....	100·03	99·33	99·94	100·00

—The characteristics of obsidian are its glassy lustre, susceptibility to high polish, and hardness, sufficient to scratch glass. The Greeks called it *ὀψιανός λίθος*, as is supposed by some from *ὄψις*, sight, in allusion to its translucence. Pliny derives its name from Obsidius, who is said to have brought it from Ethiopia. It was used by the ancients for mirrors, and for various ornamental purposes. The Mexicans used it, under the name of *itzli*, for knives, razors, and serrated weapons and implements. The pointed fragments were made into arrows. The stone is much used for ornamental purposes, particularly as mourning jewelry, but from its brittleness requires to be worked with great care. The iridescent variety, which has a peculiar greenish yellow color, and commands a high price, is sometimes cut in *cabochon* and set in rings. The colors of obsidian are numerous, but each specimen commonly has but one shade. The characteristics of pumice are sponginess and lightness, so that, although the specific gravity of the material itself is as great as that of obsidian, it is often bulky enough to float on water. It is of grayish shades, passing into yellow and brown. It is employed in the arts, pulverized as a polishing material, and in the lump for grinding and smoothing surfaces. Its chief source in commerce is Campo Bianco, one of the Lipari islands, where it forms a hill nearly 1,000 ft. high.

OBSTETRICS (Lat. *obstetrix*, a midwife), the art and science of midwifery. It has a double mission: 1, to render possible, easy, and regular, exempt from all abnormal suffering and all danger, the accomplishment of the numerous functions which directly or indirectly affect generation, from birth to the age when the procreative faculty becomes natural to the hu-

man female; 2, to direct and defend from all harm the delicate and precarious health of the infant during its early period of existence, and particularly during lactation. Labor is a natural function, and happily the intervention of art is rarely demanded. But to foresee, prevent, or remove all possible dangers, to overcome serious obstacles when they exist, to resolve the many difficult and trying questions that may arise, demand skill and judgment. The important part which woman takes in generation consists in successive acts which are accomplished in her. One of the germs or ova, enclosed in the ovary, receives through impregnation the power to develop itself, and is then transported to the uterus. This organ retains the ovum, and furnishes it the materials for its growth. It becomes first an embryo, and next a foetus, when it acquires all the necessary powers for exterior life. This succession of phenomena constitutes gestation or pregnancy. When these powers are acquired, the new being is expelled by a spontaneous action of the same organ which has contained, protected, and nourished it; and during this expulsion, known by the name of labor or parturition, in order to come to the light, it is obliged to traverse the pelvis, which is not accomplished without pain. But after its birth it still requires for some time the aid of the breasts, organs designed only for this function, which by the process of lactation furnish the necessary elements for its nutrition. The development of these phenomena is preceded and prepared for by particular modifications which the ovarian vesicles undergo. A bloody periodical discharge, called menstruation, of which the uterus is the source, ordinarily coincides with this modification of the ovarian vesicles.—Obstetrics then includes: 1, anatomy, the organs which concur to the execution of the acts above described; 2, the physiological phenomena, the mode in which these acts are performed; and 3, the pathology of these organs. As regards the anatomy, it is sufficient here to say that the female organs subservient to generation are the ovaries, the principal function of which is the production of the ovule or germ; the Fallopian tubes, designed to receive the ovule and conduct it into the cavity of the uterus; the uterus or womb, a kind of receptacle, whose office it is to contain the fecundated germ during its period of development, and to expel it immediately afterward; and finally the vagina, a membranous canal extending from the neck of the uterus to the external organs. Most of these organs are situated within a large cavity, the walls of which are composed of bones and soft parts; this is termed the cavity of the pelvis. The functions of these organs are menstruation, conception, gestation or pregnancy, and labor or parturition. These functions are limited to certain periods of life, usually from about the 15th to the 45th or 48th year. The generative faculty in women coincides with the function of menstruation. The

earliest age at which pregnancy is positively known to have occurred is 11 years; and the latest period at which parturition at the full term of gestation is recorded to have taken place is 64 years. The most prolific period, according to Dr. Bland, is between the ages of 26 and 30 years.—The signs of pregnancy may be divided into two classes: 1, those which result from the derangement of some functions, as suppression of the menses, nausea and vomiting, mammary pains, vitiated tastes, &c.; 2, those which are to be detected only by a physical examination, as the change of color around the nipple, called the areola, the enlargement of the abdomen, the movements of the fœtus, the position of the uterus in the abdomen, *bal-lottement* or reperussion, and the signs derived from auscultation, and those ascertained by touch, of the change in form, density, and position of the neck of the womb. There are some diseases which may give rise to an unjust suspicion of the existence of pregnancy, particularly those that produce enlargement of the abdomen. The chief of these are spurious pregnancy, a very curious and not very infrequent phenomenon, ovarian dropsy and dropsy of the abdomen, fibrous tumors and large polypi of the uterus, enlargement of the liver, kidney, spleen, &c., and distention of the cavity of the uterus with blood, water, or air.—It is usually admitted that the ordinary duration of pregnancy is ten lunar months, or about nine calendar months, or from 274 to 280 days; but it has long been a disputed point whether gestation may not be protracted beyond this period. The weight of authority is now in favor of the opinion that it may in some instances be prolonged to the 300th and even the 306th day. The abrupt termination of pregnancy by the premature expulsion of the product of conception is of frequent occurrence, the number of mothers who pass through the child-bearing epoch of life without ever aborting being small. The expulsion of the ovum may take place at any period of gestation. When it occurs during the first 16 weeks, it is termed an abortion; when between the end of this period and the 28th week, a miscarriage; and when after the latter period, but before the completion of the full term, a premature labor. When the fœtus is expelled before the 28th week of pregnancy, it either dies immediately or soon after birth. The causes of abortion, miscarriage, and premature labor may be classified under five heads, viz.: 1, the accidental; 2, some deranged state of the mother's health; 3, some disease of the uterus or its appendages; 4, some disease of the embryo or fœtus or its membranes; 5, when induced for criminal purposes, or necessary to preserve the life of the mother. The danger to the life of the mother depends somewhat upon the period when the abortion or miscarriage occurs. In the first or second month the ovum with its appendages generally escapes without producing any noticeable illness. In the third and

fourth months there is often considerable danger from hæmorrhage. The danger then becomes lessened after the fifth month. When the abortion originates from some slowly operating maternal or foetal disease, it is attended with much less serious consequences than when it is produced suddenly by an accident, or by the exhibition of some irritating medicines, or by puncturing the membranes. Tardieu reports 34 cases of criminal abortion, 22 of which resulted in the death of the mother. So, too, an abortion occurring during the progress of an acute inflammation of the lungs, brain, heart, liver, or bowels, forms a highly dangerous complication.—The condition of pregnancy occasionally results in a salutary change in the entire system of the mother, better health being then enjoyed than at any other period. But in a majority it induces disagreeable symptoms, amounting merely to discomfort in some individuals; in others, so great as to injure the health and even destroy life. The diseases of pregnancy are: lesions of digestion, as anorexia or loss of appetite, vomiting, sometimes so persistent as to destroy life, constipation, diarrhœa; lesions of the circulation, as plethora, hydræmia, varices, hæmorrhoids; lesions of the secretions and excretions, as pytalism, albuminuria, anæmia, leucorrhœa, dropsy of the cellular tissue, dropsy in the great cavities of the body, dropsy of the amnion (a morbid collection of water in the uterus); lesions of locomotion, as relaxation of the pelvic articulations, inflammation of the pelvic articulations; lesions of innervation, as modifications of the organs of sense, blindness, deafness, vertigo, syncope, pruritus of the vulva; and displacements of the uterus.—Labor or parturition consists in the spontaneous or artificial expulsion of a viable fœtus through the natural parts. Previous to the commencement of labor, some precursory phenomena appear, in some cases during the last fortnight of pregnancy, in others only five or six days before labor commences. They result from the dilatation of the internal orifice of the womb. The uterus, which before extended up to the stomach, sensibly sinks lower, the mechanical obstruction to respiration is removed, the stomach is no longer oppressed, but the bladder and rectum become irritable, and locomotion is more difficult. The physiological phenomena of labor are divided into three stages: the first stage ends with the dilatation of the mouth of the womb, the second with the expulsion of the fœtus, and the third with the delivery of the placenta or after-birth. The symptoms of the first stage are intermittent pains, resulting from the uterine contractions, discharge of a glairy mucus, formation of a bag of waters, and gradual dilatation of the neck of the womb. The pains of the first stage are usually borne with more impatience than those of the second. The cries which accompany them are sharp, and resemble those of any other species of suffering; those of the

second stage seem to be suppressed like those of a person carrying a heavy burden. The use of the glairy discharge is to moisten and lubricate the parts over which the child has to pass, to increase their suppleness and extensibility, and make it more easy for the ovum to slide over the surfaces. Where these discharges fail to take place, the dilatation of the mouth of the womb is always more painful and slower, and the organs are more disposed to become inflamed. The name of bag of waters is given to a protuberance formed by the membranes in the upper part of the vagina during labor. During the presence of a pain, it is hard, tense, and elastic; after the contraction is over, it becomes wrinkled and contracts or disappears. It eventually breaks, sometimes early in the first stage, and in other cases not until late in the second stage, when the contained fluid escapes. The duration of labor is exceedingly variable, even when no obstacle opposes its natural course. Some women are delivered in an hour or two, others only after several days; and between these two extremes there is every intermediate grade. In the first confinement, the average length of labor is usually from 10 to 12 hours; but in at least one case out of five it may not terminate under 15, 18, or even 24, and this without any injury whatever resulting either to the mother or child. Women who have had children are delivered much sooner, only suffering, in ordinary cases, about 6 or 8 hours. The duration of the first stage is to the second as 2 or even 3 to 1; but this law is subject to many exceptions. The third stage ought to be completed within 30 minutes.—To understand the mechanical phenomena of labor, it is necessary first to define the terms presentation and position. We designate by the term presentation the part of the child that first offers at the entrance of the pelvic cavity; and by the term position, the relations of the presenting part to the different points of the entrance to the pelvis. The attitude of the child in the uterine cavity is in a great majority of cases such that the direction of the trunk is parallel with that of the mother, and one extremity forms the most dependent part. If the head is flexed, it is called a vertex presentation. If the head is extended back, the chin far removed from the breast, it is a face presentation. When the other extremity presents, the legs are usually flexed on the thighs and the latter on the abdomen; the whole breech may therefore offer at the entrance of the pelvis, or one or both feet or knees. As the mechanism of labor must be the same in all these cases, they are all included under the term pelvic presentations. But it may happen that, instead of one of the extremities offering, some portion of the trunk may offer, the child lying transversely in the uterus, and this may be either some point of the right half or of the left half of the trunk. We have then five primary presentations, one of the head, one of the face, one for the pelvic

extremity, one for the right lateral plane, and one for the left lateral plane. The presentation of the head is incomparably more frequent than all the others. According to Mme. Boivin, in 20,357 cases it occurred in 19,730. The fetus presents by the face, on an average, once in 250 labors. The pelvic presentation occurs once in 30 or 35 labors. The trunk presentations are a little less rare than the face, occurring about once in 200 cases. As a law it may be said that trunk presentations always demand the interposition of art to accomplish delivery. The other presentations generally terminate spontaneously. In order that a labor may terminate without foreign aid, there must be on the part of the mother no fault or deformity of the pelvis, no serious affection of the womb, and the organ must possess a certain energy; the general powers of the system must not have been exhausted either by a profuse hæmorrhage or any long continued disease; there must be no affection making it dangerous for the woman to give herself up fully to the efforts that she is compelled to make; and no accident must supervene during the labor. On the part of the child, it is important that it should descend with the head, the face, the feet, the knees, or the breech foremost, and that it should not be of a size disproportionate to the capacity of the pelvis. About one case in 30 requires in some form artificial aid to complete a happy delivery.—The obstetric operations required for cases of difficult and dangerous labor, either to save the life of the mother or child or both, are: 1, induction of premature labor, an operation of great importance and value in certain cases; 2, version or turning, that manual operation by which one presentation is substituted for another less favorable; 3, the vectis, to correct malpositions or aid the natural rotations of the head; 4, delivery by forceps; 5, craniotomy, an operation by which the life of the child is sacrificed in order to save the mother; 6, the Cæsarean section, in which the child is extracted through an incision in the walls of the abdomen and uterus. The dangerous complications which may arise in connection with labor are: prolapse of the cord or funis, an accident very fatal to the child; flooding or hæmorrhage; retention of the placenta; convulsions; rupture of the uterus; lacerations of the vagina or perineum; and inversion of the uterus.—The progress of obstetrical science and the improvement in the art have been very marked in recent times. According to Tanner, "the 20th annual report of the registrar general of births, deaths, and marriages in England shows that in the year 1847 the birth of every 10,000 living children was the death of 60 mothers, whereas in 1857 it was only fatal to 42; hence 18 mothers are now saved in every 10,000 children born. Since 1848 the decline has been progressive, the numbers per 10,000 being 61, 58, 55, 52, 47, 47, 44, and 42 in 1857." Among the most striking modern improvements in obstetrical

science and practice may be mentioned the application of auscultation to obstetrics; a more perfect knowledge of the mechanism of labor, and of the management of *placenta prævia*; the introduction of anæsthetics; the induction of premature labor; an increased frequency in the use of the forceps, and a less frequent resort to craniotomy; and the substitution of version in cases where either craniotomy or the long forceps were formerly employed.

O'CALLAGHAN, Edmund Bailey, an American author, born in Mallow, county Cork, Ireland, about 1804. After residing two years in Paris, he went in 1823 to Quebec, where he was admitted to the practice of medicine in 1827. From 1834 to 1837 he edited the "Montreal Vindicator," and in 1836 he was a member of the assembly of Lower Canada. He removed to New York in 1837, received the honorary degree of M. D. from the university of St. Louis, Mo., in 1846, and subsequently that of LL. D. from St. John's college, Fordham. He was keeper of the historical manuscripts in the office of the secretary of state at Albany from 1848 to 1870, when he returned to New York. During his residence in Albany he translated several volumes of the Dutch records in the secretary of state's office. His principal publications are: "History of New Netherland" (2 vols. 8vo, 1845-'8); "Jesuit Relations of Discoveries" (1847); "Documentary History of New York" (4 vols. 4to, 1849-'51); "Documents relating to the Colonial History of New York" (11 vols. 4to, 1855-'61); "Commissary Wilson's Orderly Book" (1857); "Orderly Book of Gen. John Burgoyne" (1860); "Journals of the Legislative Councils of New York" (2 vols.), and "Origin of the Legislative Assemblies of the State of New York" (1861); "A List of the Editions of the Holy Scriptures and parts thereof printed in America previous to 1860" (1861); "The Register of New Netherland, 1626-'74;" "Voyages of the Slavers St. John and Arms," and "Voyage of George Clarke to America" (1867); "Historical Manuscripts relating to the War of the Revolution" (2 vols., 1868); "Laws and Ordinances of New Netherland, 1638-'74" (1869).

OCCAM, or Ockham, William of, an English scholastic philosopher, born at Occam in Surrey about 1270, died in Munich, April 7, 1347. He was of humble parentage, was educated at Merton college, Oxford, and was appointed in 1302 first prebendary of Bedford, and in 1305 of Stowe. On the controversy between Philip the Fair and Boniface VIII. he opposed the pretensions of the pope. In 1319 he resigned his livings and became a Franciscan monk. He was sent to Paris to complete his studies under Duns Scotus, his old master at Oxford, whose most formidable adversary he afterward became. Having obtained his doctor's degree, he taught theology with such success as to win the appellation of "the invincible doctor," and subsequently was a strenuous adversary of the

papal claims of sovereignty over secular princes. In 1322, in the general Franciscan chapter assembled at Perugia, he argued against Pope John XXII. that Christian priests neither individually nor in community should be the possessors of property. His manifesto, entitled *Disputatio super Potestate Ecclesiastica Prælati atque Principibus Terrarum commissa*, was condemned by the pope; but, supported by Michael of Cesena, general of his order, he continued to assail the practices of the holy see. In the same year he was appointed provincial of the Franciscans in England, and while there advocated his anti-papal doctrines with still greater freedom. Summoned with his disciples in 1327 by Pope John XXII. before the court of Avignon, he fled to the court of the emperor Louis the Bavarian, where he remained till his death. In his age he was the champion of the Franciscans and the nominalists against the Dominicans and the realists. His philosophical and theological writings are: *Quodlibeta Septem* (Paris, 1487; Strasburg, 1491); *Summa totius Logices*, or *Tractatus Logices in tres partes divisus* (Paris, 1488; Venice, 1591; Oxford, 1675); *Quæstiones in Libros Physicorum* (Strasburg, 1491 and 1506); *Quæstiones et Decisiones in quatuor Libros Sententiarum* (Lyons, 1495); *Centilogium Theologicum* (Lyons, 1496); *Expositio Aurea super tota Arte Vetere* (Bologna, 1496); *Opus nonaginta Dierum contra Errores Joannis XXII de Utili Dominio Rerum Ecclesiasticarum* (Lyons, 1495 and 1496, and also in Goldast's *Monarchia Romani Imperii*, 3 vols. fol., Hanover, 1611-'14); and the above mentioned *Disputatio* (Paris, 1598, and in the *Monarchia*).

OCCOM, Samson, an Indian preacher, born at Mohegan, New London co., Conn., about 1723, died at New Stockbridge, N. Y., in July, 1792. When 19 years old he entered the Indian school of Mr. Wheelock at Lebanon, and remained there four years. In 1748 he kept a school in New London, but shortly after removed to Montauk, Long Island, where he taught and preached. In 1766 Mr. Wheelock sent him to England as an agent for Moor's Indian charity school. Being the first Indian preacher who had visited that country, he attracted large audiences and obtained gifts. He wrote an account of the Montauk Indians, still in manuscript.

OCEAN, the great body of salt water which surrounds the continents and covers more than three fifths of the whole surface of the globe. By the configuration of the lands which rise above its surface, it is partially separated into a number of divisions, known by distinct names, as the Atlantic, Pacific, Indian, Arctic, and Antarctic oceans, which are separately treated, the last two in the article **POLAR SEAS**. The Antarctic is divided from the adjoining oceans, not by intervening bodies of land, but by the imaginary line of the Antarctic circle. The nearly landlocked arms of the ocean are designated as seas, bays, and gulfs. All these bodies of water are united together in one

great system, and are kept of nearly uniform composition, notwithstanding numerous local causes of change, chiefly by means of great currents which circulate through them. Some of these currents are of vast extent, spreading over a large part of the oceans to which they belong, and with but slight variations they move without cessation in the great system of the circulation of the waters. A principal characteristic of the water of the ocean is its saltness. This is owing to various saline matters, prominent among which are chlorides, chiefly chloride of sodium or common salt. There are several sulphates, carbonates, iodides, and bromides, all the saline matter forming about $\frac{3}{100}$ of the weight of the water which holds it in solution. Prof. Henry Wurtz suggested in the "American Journal of Mining" in 1868 that gold be sought for in sea water, and Sonstadt has since found a little less than one grain to the ton of water, held in solution by iodide of calcium. Silver deposited on the old coppering of ships has been extracted in quantities sufficient to make its separation profitable, and it has been computed that the whole ocean holds in solution about 2,000,000 tons of silver. A more exact analysis will be given in the article WATER. The proportion of salt varies in different places, sometimes exceeding 4 per cent. It is large where the water is deepest, but does not increase with the depth. Though inland seas generally contain less salt, the Mediterranean contains more of it than the ocean itself; the specific gravity of its water east of the straits of Gibraltar has been found to be 1.0333, while that of water from the ocean west of the straits was 1.0294. The specific gravity of sea water near the equator is about 1.0277. Prof. Forchhammer of the university of Copenhagen, between the years 1840 and 1864, made numerous analyses of sea water from various parts of the globe, and embodied his investigations in a communication which appeared in the "Philosophical Transactions" of London for 1865. He found that the polar currents contain less salt than the equatorial, and that the proportion of saline matter in the Mediterranean was 3.793 per cent.; in the Caribbean sea, 3.610; and in the Red sea, 4.306. He divided the whole ocean into 17 regions, from each of which he made numerous analyses. The saline elements of the water may be derived from geological formations consisting in great part of such elements; but strata of this character always bear evidence of being deposited from ancient oceans, so that this derivation throws no light upon the real source of the salt. In different parts of the ocean various substances introduced by great rivers modify locally the composition of its waters; and from the strata beneath the sea there no doubt emanate mineral springs, such as appear upon the land. Springs of fresh water are known in many places to rise up through the salt water, and some of them even furnish supplies to vessels. It is supposed that the devel-

opment of animal life, particularly the formation of coral, tends to preserve the equableness of the salinity of the ocean, and also its purity. (See CORAL.)—The color of the sea, commonly described as bluish green, is by no means uniform, and the causes of the changes of its hue have until recently been unexplained. In the tropics it is at one time an indigo blue, then a deep green; and upon some coasts a reddish or purplish hue is observed. The cause of the color is now regarded as depending on the action of suspended particles of solid matter on the light which traverses the water. Light on entering the water is refracted, and therefore more or less resolved into its primary colors, especially if the water is of sufficient depth. The red, orange, and yellow rays do not penetrate the water to so great a depth as the blue and violet. Now the presence of minute solid particles causes some of the light after entering the water to be reflected, and the color of this reflected light will depend upon the depth at which the reflection takes place. If the particles are large and freely reflect from a moderate depth, they will also prevent reflection from a greater depth, so that the rays coming to the eye of the observer will be green; but if the particles in the upper strata are minute and the reflection is from a considerable depth, the color will be more nearly a pure blue. The subject was experimentally examined by Prof. Tyndall while making a voyage in a steamer. His assistant cast a white plate attached to a cord into the water to a moderate depth, and when it reached the proper point of observation its color was green, although that of the water was blue. The phosphorescence of the sea is another of its characteristics. This varies under different circumstances, and is owing to the presence of myriads of invertebrate animals, some of which are microscopic, while others are of considerable size, as the jelly fishes. In the firths on the coast of Norway the crystal clearness of the water is wonderful; at the depth of 20 or 25 fathoms small objects may be discerned upon the sandy bottom, apparently magnified by the water itself.—The depth of the ocean is very uncertain, and has been greatly overrated. The difficulties of deep-sea soundings are referred to in the article ATLANTIC OCEAN. With reference to organic life at various depths, see DREDGING (DEEP-SEA). The extent of the surface of the ocean is estimated to be about 146,000,000 sq. m., or nearly three fourths of the whole earth's surface.

OCEAN, an E. county of New Jersey, bordering on the Atlantic, and drained by Meteteunk and Toms rivers and several creeks; area, about 550 sq. m.; pop. in 1870, 13,628. A sand beach from $\frac{1}{2}$ to 1 m. wide extends along the coast, and between it and the mainland are two lagoons, Barnegat bay and Little Egg Harbor inlet. The surface is level, and much of it covered with pine forests; the soil is light and sandy. Iron is found and manufactured in

large quantities in the north. It is intersected by the New Jersey Southern railroad and the Toms River branch, and the Tuckerton and Camden and Amboy railroads. The chief productions in 1870 were 9,273 bushels of wheat, 13,768 of rye, 106,969 of Indian corn, 10,228 of oats, 52,719 of Irish and 8,760 of sweet potatoes, 75,926 lbs. of butter, and 7,348 tons of hay. There were 982 horses, 1,755 milch cows, 1,348 other cattle, 1,470 sheep, and 2,387 swine; 4 manufactories of brick, 1 of stone and earthen ware, 1 of jute bagging, 1 iron foundry, 5 flour mills, and 10 saw mills. Capital, Toms River.

OCEANA, a W. county of Michigan, on Lake Michigan, drained by White and Marquette rivers and other streams; area, 780 sq. m.; pop. in 1870, 7,222. It has an undulating surface and a good soil. The chief productions in 1870 were 20,149 bushels of wheat, 40,397 of Indian corn, 11,011 of oats, 73,007 of potatoes, and 2,369 tons of hay. There were 433 horses, 663 milch cows, 1,133 other cattle, 526 sheep, and 1,603 swine. Capital, Hart.

OCEANIA, or *Oceanica*, a name applied by geographers to a fifth division of the globe, comprising Australia and almost all the islands lying between the Indian ocean and the China sea, on the west, and the American continent, on the east. It is subdivided into Malaysia, embracing the Sunda islands, Borneo, Celebes, the Moluccas, and the Philippines; Australasia, embracing Australia, Papua, New Zealand, &c.; and Polynesia, embracing all the islands N. E. and E. of Malaysia and Australasia. Some geographers apply the name Micronesia to the northern division of Polynesia, and Melanesia to the northeastern division or the whole of Australasia.

OCEANUS, in ancient mythology, the god of the water (the river Oceanus) which was believed to encircle the earth. According to Hesiod, he was the son of Uranus and Gæa (Heaven and Earth), and was the eldest of the Titans. He was said to have 3,000 daughters by Tethys (the Oceanids), and as many sons.

OCELLUS LUCANUS, a Greek Pythagorean philosopher, born in Lucania in Italy, and supposed to have flourished in the 5th century B. C. The works attributed to him were "On Law," "On Kingly Rule and Piety," and "On the Nature of the Whole" (of Things). In the last, which is the only one that has come down to us, it is argued that the whole (τό πᾶν or ὁ κόσμος) had no beginning, and will have no end. Tennemann pronounces it apocryphal. The best editions are by A. F. W. Rudolphi (Leipsic, 1801-'8), and Mullach (Berlin, 1846). Ocellus was translated into English by Thomas Taylor in 1831.

OCELOT, an American group of medium-sized cats, of slender and elegant proportions, without tufts to the ears, and with more or less elongated and connected spots diverging in longitudinal rows backward and downward from the shoulders, of a yellowish color bor-

dered with black. The common ocelot (*Felis pardalis*, Linn.) is about 3 ft. long to the base of the tail, the latter being about 15 in. additional; the general color is grayish, with large



Common Ocelot (*Felis pardalis*).

fawn-colored, black-bordered spots, forming oblique bands on the flanks; ears black, with a white spot below; chin and throat white, with a black bar beneath the former and another under the neck; two black lines on the side of the forehead and two behind each eye; under surface white, with irregular black patches; tail above black, with narrow bands of white. Specimens vary much in their markings, in the tinge of the tawny spots, in the chain-like character of the streaks, and in the spots and blotches on the legs. It is found in Brazil and Guiana, and in Mexico and the southwestern United States. The head is short, the neck long and thin, the body slender, tail moderate, and hair soft and not very thick. It is called leopard and tiger cat in Texas and Mexico, is rather nocturnal in habit, and climbs trees in pursuit of small animals and birds; though active and muscular, it is easily tamed,



Margay (*Felis tigrina*).

and is gentle and playful in captivity, unless fed on raw meat exclusively; it is very graceful and quick in its movements, and when pursued takes to a tree; it is seldom seen on the

open plains, preferring woods and thickets. From its smallness, it is little to be feared by the herdsman; but from the beauty and value of the skin, it is always killed when an opportunity occurs. In the linked ocelot (*F. catenata*, H. Smith), by many considered a mere variety of the last, the markings are more lengthened, the ground color more reddish, and the body and limbs stouter. The long-tailed ocelot (*F. macroura*, Neuwied) is often grayish tawny yellow, paler below, with irregular unenclosed longitudinal markings on the body; of a total length of 44 in., the tail forms about 19, and is semi-annulated, black at the tip. Another allied species, inhabiting, like all the above, South America, is the margay (*F. tigrina*, Linn.); it is 18 in. long, with a tail of 8 in.; the color is tawny yellow, with black lines and bands upon the head, neck, and throat; the open spots of the body enclose a reddish centre, and are surrounded by a black line; the limbs are spotted and the tail ringed with black.

OCHRA. See OKRA.

OCHRE, earthy oxide of iron employed with oil as a paint. When obtained as a native product it is intermixed with argillaceous or calcareous earth; and it is also prepared by the decomposition and oxidation of pyritous ores. Deposits of it are produced about springs that flow from rocky beds which contain decomposed iron pyrites. The color of the material varies with the degree of oxidation of the iron, and may be changed by heat from yellow to brown and red. The earthy matters present also affect its color, and these may be partially or wholly removed by washing, the heavy sediments remaining behind. For the finer varieties of ochre these sediments are ground in mills. Ochres are sold under a variety of names. The coarser sorts are sometimes known as stone ochres. A kind from the Persian gulf is called Indian red. There are also the Spanish brown, a yellow variety known as the French ochre, the Oxford and Roman ochres of brownish yellow colors, and others distinguished merely by the names of their colors. Dr. Thomson says the term ochre is applied to native oxides of cerium, molybdenum, lead, tungsten, chromium, and uranium.

OCKLEY, Simon, an English orientalist, born in Exeter in 1678, died at Swavesey, Cambridgeshire, Aug. 9, 1720. He was educated at Queen's college, Cambridge, and became vicar of Swavesey in 1705 and professor of Arabic at Cambridge in 1711. His principal work, compiled from Arabic manuscripts in the Bodleian library, is a "History of the Saracens" (2 vols. 8vo, 1708-'18). He dates the second volume from Cambridge castle, where he was imprisoned for debt. His other works include *Introductio ad Linguas Orientales* (1706) and a new translation from the Arabic version of the second "Apocryphal Book of Esdras" (1716).

OCMULGEE, a river of Georgia, about 200 m. long, formed by three branches, the South,

Yellow, and Ulcofauhachee, which rise in the N. part of the state and unite at the S. corner of Newton co. It flows in a S. S. E. direction till toward its termination, when it sweeps round in a curve to the N. N. E., and joins the Oconee at the S. extremity of Montgomery co., where the two form the Altamaha. It receives the Little Ocmulgee, its principal tributary, about 10 m. from its mouth. It is navigable for steamboats of light draught to Macon, where there is a fall affording great water power.

OCONEE, the N. W. county of South Carolina, bounded N. by North Carolina, E. by the Keowee river, and separated from Georgia on the west by the Chattooga and Tugaloo rivers; area, about 550 sq. m.; pop. in 1870, 10,536, of whom 2,422 were colored. The N. part is hilly and mountainous; the rest is rolling and undulating. The soil of the valleys is fertile. The Blue Ridge railroad terminates at Walhalla, and the Atlanta and Richmond Air Line railroad crosses the county. The chief productions in 1870 were 10,533 bushels of wheat, 138,903 of Indian corn, 8,950 of sweet potatoes, 810 bales of cotton, 8,029 lbs. of wool, and 23,660 of rice. There were 818 horses, 1,578 milch cows, 3,270 other cattle, 4,858 sheep, and 6,502 swine. Capital, Walhalla.

OCONEE, a river of Georgia, which rises in Hall co., in the N. E. part of the state, and flows in a S. S. E. direction until its junction with the Ocmulgee to form the Altamaha. Its total length is about 250 m., and it is navigable to Milledgeville, 100 m. above its mouth.

O'CONNELL, Daniel, an Irish statesman, born at Carhen, near Cahirciveen, county Kerry, Aug. 6, 1775, died in Genoa, May 15, 1847. He was the eldest son of Morgan O'Connell, a Catholic gentleman. At the age of 13 Daniel was sent to a school at Redington, Long Island, near Cove, or Queenstown as it is now called. Here he remained about a year, and in 1791 he was sent to the Jesuits' college of St. Omer in France, where he first gave indication of talent. In the following year he spent a short time at the English college in Douai; but on the outbreak of the reign of terror he returned home. He was called to the bar in 1798, and soon became distinguished as a brilliant and successful advocate. He had no sympathy with the violent revolutionary spirit of the period, which in fact throughout his life he opposed, in accordance with his well known saying that "he would accept of no social amelioration at the cost of a single drop of blood." His first political speech was made at Dublin, Jan. 13, 1800, at a meeting of Catholics to petition against the proposed legislative union between Great Britain and Ireland; the meeting was broken up by the military. From this period dates his career as a public agitator. In a few years he was in good practice and had gained a high reputation as a barrister. He then became gradually absorbed in politics, and was soon the acknowledged leader of political reform in Ireland. He devoted himself with

surprising force and energy to the question of the claims of the Roman Catholics of Ireland to political equality with Protestants. In 1815 O'Connell, having in one of his speeches applied the term "beggary" to the corporation of Dublin, was challenged by Mr. D'Esterre, a member of the city government. A duel ensued, and D'Esterre received a wound of which he died. For this event O'Connell always expressed the deepest sorrow, and he never again accepted or offered a challenge. In 1828 the agitation of the Catholic emancipation bill reached its greatest height under the direction of the Catholic association. In June of that year O'Connell was elected to parliament from the county Clare by a large majority. On proceeding to take his seat, he refused as a Roman Catholic to take the test oaths which had been framed for the express purpose of excluding those who held his faith. His firm attitude on this point commanded general attention, and led to protracted and animated discussions both in parliament and before the people. The agitation in Ireland, under his guidance, rose to such a height that at length the great leaders of the conservative party, Sir Robert Peel and the duke of Wellington, resolved to concede emancipation to the Catholics. Parliament met Feb. 6, 1829; the speech from the throne recommended a final, equitable, and satisfactory adjustment of the Catholic claims; in the course of the session the last of the civil disabilities to which the Catholics had been so long subject were repealed; and in May O'Connell took his seat. In 1830 he declined the representation for Clare, and was elected for Kerry. He represented Dublin from 1832 to June, 1835, and again in 1837. In the latter part of 1835 he was elected for Kilkenny, and in 1841 for the county Cork, and in the same year lord mayor of Dublin. He proclaimed that a repeal of the legislative union between Great Britain and Ireland was the only means of obtaining justice for the latter kingdom. To compensate him for the loss of his income as a lawyer, and to reward his public services, an annual subscription was organized among the Irish people, under the denomination of "rent," and paid to O'Connell. In 1842 and 1843 immense gatherings, or monster meetings as they were called, were held by the repealers on the royal hill of Tara, the Curragh of Kildare, the Rath of Mullaghmast, and other historical places. Some of these assemblages were estimated at 500,000 persons. The liberator, as O'Connell was now familiarly called, appeared at them, making the most exciting speeches, but taking extreme care in action to keep his followers within the bounds of law. At length he called a monster meeting at Clontarf near Dublin on Sunday, Oct. 8, 1843; and the preparations for it, including a body of "repeal cavalry," had such a military air that the government thought it time to interfere. On Oct. 7 a proclamation was issued declaring the public peace endangered by these meetings, and

warning all persons to keep away from Clontarf. O'Connell countermanded the meeting, and the people generally stayed away. On Oct. 14 he was arrested by order of the government, together with his son and eight of his coadjutors, on charges of conspiracy, sedition, and unlawful assembling. They were tried and found guilty. O'Connell was sentenced to imprisonment for twelve months and to pay a fine of £2,000, and was bound over to keep the peace for seven years. An appeal was made to the house of lords, and the decision of the Irish judges was reversed. This trial gave a death-blow to the repeal movement. For a while the monster meetings continued, but very soon dissensions broke out between O'Connell and some of his associates belonging to the party of "Young Ireland," who scoffed at his renunciation of physical force in seeking political reforms. He grew anxious and feeble and at length ill, and had to abandon political agitation altogether, to which indeed the famine now creeping over Ireland put a sudden stop. At length his physicians directed that newspapers should be kept from him, and no one admitted to his presence who would speak of Ireland. Early in 1847 he set out on a pilgrimage to Rome, hoping to die there with the blessing of the pope; but he sank too rapidly, and died on the way at Genoa. His heart was embalmed and carried to Rome, and his body taken back to Ireland.—See the "Life and Speeches of Daniel O'Connell," by his son John O'Connell, M. P. (2 vols., London, 1846), and "The Liberator, his Life and Times," by L. F. Cusack (London, 1872).

O'CONNOR, Arthur, a leader in the Irish rebellion of 1798, born in 1763, died near Nemours, France, April 25, 1852. He was admitted to the bar in 1788, became a member of the Irish parliament, and made a speech in favor of Catholic emancipation, which so offended his uncle, Lord Longueville, that he disinherited him. Joining the United Irishmen, he became one of their directory of five. He was twice arrested, and once tried for high treason, but was acquitted. He took up his residence in France, and in 1804 was created by Napoleon lieutenant general, and subsequently general of division. In 1807 he married the daughter of the philosopher Condorcet, whose works he is said to have edited. He published "Letters to the Earl of Carlisle, in reply to Earl Fitzwilliam's two Letters on the State of Ireland" (1795); "Letters to Earl Camden" (1798); "The Present State of Great Britain" (1804); and a volume against the Bourbons and monarchy in general (1830).

O'CONNOR, Feargus Edward, a British agitator, born at Dangan Castle, county Meath, Ireland, in 1796, died at Notting Hill, near London, Aug. 30, 1855. He was returned to parliament for the county of Cork in 1832, but on his reelection in 1835 he was unseated as disqualified. He then joined in the agitation for the rights

of the lower classes, made many public addresses, edited the "Northern Star," and was regarded as the head of the chartist party, which returned him to parliament for Nottingham in 1847. On the failure of his efforts, he visited America, but became insane in 1852, and spent the rest of his life in an asylum.

O'CONNOR, William Douglas, an American author, born in Boston, Mass., in 1833. He studied art for several years in Boston, but in 1853 became associate editor of the "Commonwealth" newspaper in that city. From 1854 to 1860 he was connected editorially with the "Saturday Evening Post" in Philadelphia. In 1861 he became corresponding clerk of the lighthouse board at Washington, and in 1873 was appointed chief clerk. He resigned this post in 1874, and became librarian of the treasury department. He has published "Harrington," a romance (Boston, 1860); "The Good Gray Poet," a pamphlet in vindication of Walt Whitman (New York, 1866); and "The Ghost" (New York, 1867); besides numerous poems and stories contributed to magazines, the most noted of the latter being "The Carpenter" and "What Cheer?"

O'CONNOR, Charles, an American lawyer, born in New York in 1804. Shortly before his birth his father emigrated from Ireland, and soon after his arrival lost a handsome property which he had inherited. This prevented the son from receiving a liberal education; but he learned at school the primary English branches, and received some instruction in Latin from his father, who also procured for him lessons in French. He studied law, and in 1824 was admitted to the bar. His first reported argument is in the case of *Divver v. McLaughlan*, in the supreme court in 1829. His chief cases are the slave Jack case (1835), the Lispenard will case (1843), the Forrest divorce case (1851), the Mason will case (1853), the Lemmon slave case (1856), the Parish will case (1862), and the litigation concerning the Jumel estate; and he has been employed in many other important cases, some of which involved sums varying from \$100,000 to millions. He was prominent in prosecuting the so-called "ring" cases against the late municipal officers of New York in 1873. A zealous democrat, he has been repeatedly urged by his party to accept nominations to the highest offices, but refused. He consented to serve for 15 months as United States district attorney for New York under President Pierce, and was a member of the New York state constitutional conventions of 1846 and 1864. He was nominated for the presidency by the labor reform convention in Philadelphia, Aug. 22, 1872, and by the so-called straight-out democrats in Louisville, Ky., Sept. 3. He declined both nominations, but in the subsequent presidential election received 29,489 votes.

OCOONTO, a N. E. county of Wisconsin, bounded N. E. by Michigan, from which it is separated mostly by the Menominee river, and S. E. by Green bay; area, 2,268 sq. m.; pop. in 1870,

8,321. It is drained by the Oconto, Peshtego, Wolf, and other rivers, and is covered with pine forests. It is intersected by the Wisconsin division of the Chicago and Northwestern railroad. The chief productions in 1870 were 22,113 bushels of wheat, 25,481 of oats, 36,300 of potatoes, 46,300 lbs. of butter, and 3,566 tons of hay. There were 352 horses, 522 milch cows, 746 other cattle, 274 sheep, and 729 swine. Capital, Oconto.

OCOSINGO, a town in the Mexican state of Chiapas, 65 m. S. E. of Ciudad Real; pop. about 4,000. It derives its principal interest from a series of extraordinary aboriginal monuments in its vicinity, which closely resemble those of Palenque. They have been in part described by Mr. Stephens in his "Incidents of Travel in Central America," and by Capt. Dupaix in his report to the Spanish crown on the antiquities of Mexico.

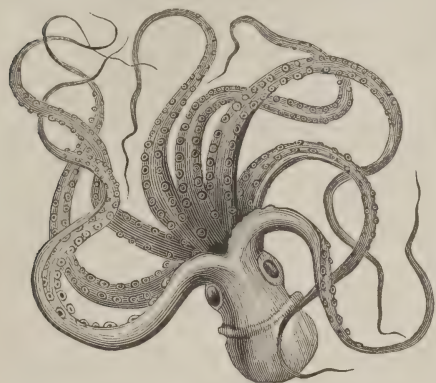
OCTAVIA, sister of the emperor Augustus and wife of Mark Antony, died in 11 B. C. She was married to Claudius Marcellus, from whom Julius Caesar was anxious to have her divorced, that she might marry Pompey; but the latter declined, and she continued to live quietly with her husband until his death in 41 B. C. The alliance between Octavius and Antony was now strengthened by the marriage of Octavia to the latter. She accompanied her husband on his eastern expedition, and by her mediation effected a reconciliation between him and her brother in 37. Antony, now undertaking an expedition against the Parthians, fell again under the influence of Cleopatra; and when in 35 Octavia went to the East with reinforcements of men and money, he accepted the aid, but refused to meet her. On her arrival home she would not take any part against her husband, but remained at his house and educated his children; yet in 32 Antony sent her a bill of divorce. After his death she brought up his children by Fulvia, and even those by Cleopatra. Octavia had five children, three by Marcellus and two daughters by Antony; from the two latter were descended the emperors Caligula, Claudius, and Nero. She was possessed of great accomplishments, and was universally considered the superior of Cleopatra in beauty.

OCTAVIUS. See **AUGUSTUS**.

OCTOBER (Lat. *octo*, eight), the tenth month of the year. In the Roman calendar it was originally the eighth, whence its name, which it retained after the beginning of the year had been changed from March to January. It was sacred to Mars.

OCTOPUS, or **Poulpe**, a cephalopod mollusk, having a round purse-like body, without fins, and eight arms united at the base by a web, by opening and shutting which it swims backward, after the manner of the jelly fishes. Each arm has a double alternate series of suckers, by which they seize their prey, and moor themselves to submarine objects. Swimming is also effected, backward, forward, or side-

wise, by jets from the siphon, which may be turned in any direction; they can also crawl, looking like tipsy spiders, on their long flexible arms, in the manner shown in the third engraving. They are solitary, active, and voracious, seeking their food chiefly at night. They are



Common Poulpe (*Octopus vulgaris*).

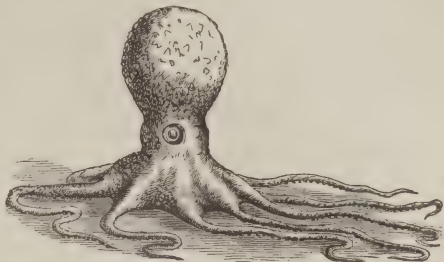
the *polypi* of Homer and Aristotle. There are more than 40 species of octopods, found principally in the temperate and tropical seas, though some are met with in cold waters; they vary in size from an inch to 5 ft. in length of body, the arms being as much more. The common poulpe (*O. vulgaris*), of the European seas, has the body about as large as the clenched fist, with the arms expanding 3 or 4 ft. The *O. tuberculatus* of the Mediterranean has a rough body about 5 in. long, and the arms 20 to 24 in.; it is often exposed for sale in the markets



Octopus tuberculatus.

of Naples and Smyrna. Species of the same size abound in the Pacific, and are eaten in the Hawaiian and other islands, and in the East Indies. In tropical America they grow very large; one was found dead on the beach at Nassau, Bahamas, 10 ft. long, each arm mea-

suring more than 5 ft., and estimated to weigh about 250 lbs.; and they are believed to exist there even larger than this. In cold waters they are small and not to be feared by man; but in the tropics, as on the coast of Brazil, the large species are very powerful and dangerous.



An Octopus crawling.

The common poulpe of the French coast has given rise to the mythical "devil fish" introduced by Victor Hugo in the "Toilers of the Sea." The novelist has mixed up a polyp and a poulpe, misled by the name given by Aristotle, and thus manufactured an impossible creature. The kraken of the Scandinavian nations is a mythical immense octopod, for which the recent discovery of a gigantic cephalopod on the coast of Newfoundland seems to afford a foundation in truth. (See SQUID.) The genus *eleuthero* differs from *octopus* chiefly in having only a single series of suckers on each arm. All the species have an ink bag, by the contents of which the surrounding water is discolored, enabling them to escape their cetacean and other enemies. For details of structure, see CEPHALOPODA.—The only species known on the Amer-



Octopus Bairdii (life size).

ican coast, north of Cape Hatteras, is the one discovered in 1872 in the deep waters of the bay of Fundy by Prof. Verrill, and named by him *octopus Bairdii*; several, all males, were dredged during that summer in 75 to 200 fathoms, on shelly, muddy, and sandy bottoms.

The largest had a body 2 in. long and $1\frac{1}{4}$ in. wide, with arms $2\frac{1}{4}$ in. long; the color pale bluish white, translucent, with specks of light and dark brown. The body was short and thick, dotted with erectile tubercles, broadly rounded posteriorly; head almost as broad as body, swollen and rough about the eyes; arms of about equal length, relatively short, stout, and tapering, and webbed for the basal third. Each arm had two rows of 60 to 65 acetabula or suckers; the right arm of the third pair, for about a third of its length, was modified into a large spoon-shaped organ for reproduction, evidently not to be detached from the animal, as in many male cephalopods. The females, in this class generally by far the more numerous, were not seen, but were probably considerably larger than the males. Several were kept in confinement in tanks, and were most active at night. It was seen that when they were swimming by the basal web and the siphon, after each contraction of these parts and during the motion backward, the arms were held straight forward in a compact bundle; the only way in which they could swim forward seemed to be by ejecting jets of water from the siphon curved backward. The southern American species are very much larger, and very different.

O'CURRY, Eugene, an Irish archaeologist, born at Dunaha, near Carrigaholt, county Clare, in 1796, died in Dublin, July 30, 1862. He was an assistant in the antiquarian department of the government ordnance survey of Ireland from 1834 to 1841, when he was employed by the royal Irish academy and by Trinity college, Dublin, in transcribing and cataloguing their Gaelic MSS. He also rendered valuable assistance in the publication of the Irish archaeological society, and was a member of the council of the Celtic society. In 1853 he was engaged with Dr. O'Donovan, under the Brehon law commission, to transcribe and translate ancient laws from originals in Trinity college and the British museum; these he had himself in great part discovered, and he was the first modern scholar able to decipher and explain them. (See BREHON LAWS.) In 1854, on the establishment of the Roman Catholic university in Dublin, he was appointed to the chair of Irish history and archaeology. He translated "Battle of the Magh Leana, together with the Courtship of Mornera" (Dublin, 1855), and published his "Lectures on the Manuscript Materials of Ancient Irish History" (1861).

OD. See REICHENBACH, KARL.

ODD FELLOWS, Independent Order of, a secret charitable society, existing chiefly in Great Britain and the United States. I. **MANCHESTER UNITY.** From societies of mechanics and laborers which existed in London in the latter part of the 18th century, calling themselves "Ancient and Honorable Loyal Odd Fellows," and holding convivial meetings, sprang the "Union Order of Odd Fellows," which had its seat of government in London and spread rapidly to other English cities. From attempts

to abolish its convivial character arose a schism which culminated in 1813, when several seceding lodges formed the Manchester unity. In 1825 a central standing committee was established in Manchester to govern the order in the interim between the sessions of the grand lodge or national movable committee, as it is termed, and the Manchester unity still constitutes the main body of British odd fellows. It numbers about 500,000 members. II. **AMERICAN.** Thomas Willey and four others organized Washington lodge No. 1, in Baltimore, Md., April 26, 1819, to work according to the usages of the London or union order. A lodge was organized in Boston, Mass., March 26, 1820, and one in Philadelphia, Dec. 26, 1821, both of which received grand charters from Baltimore in June, 1823. At the same time a grand charter was granted to the past grands in New York. Since then the order has been established in every state and territory of the Union. There were in the United States and Canada at the date of the last report 48 grand lodges, 36 grand encampments, 5,486 subordinate lodges, 1,512 subordinate encampments, and 512 Rebekah degree lodges. Candidates for admission to the order must be free white males of good moral character, 21 years of age or over, who believe in a Supreme Being, the creator and preserver of the universe. Fidelity not only to the laws and obligations of the order, but to the laws of God, the laws of the land, and all the duties of citizenship, is strictly enjoined; but the order is a moral, not a religious organization. Its secrecy consists solely in the possession of an unwritten and unspoken language, intelligible only to its members, which serves simply for mutual recognition. Five or more members may constitute a subordinate lodge, whose functions are chiefly administrative; it provides the means to meet the claims of its sick and distressed members, to bury the dead, to relieve the widow, and to educate the orphan. The by-laws constitute the legal contract between the initiate and the lodge. To the lodge belong a series of degrees, known as the initiatory, white, pink, blue, green, and scarlet, representing a code of moral lessons. In 1851 the degree of Rebekah was adopted by the grand lodge of the United States, for the use of ladies legally connected with subordinate lodges by male membership. The lodge is officered by a noble grand, vice grand, secretary, and treasurer, elected semi-annually. The grand lodge consists of the past grands of its subordinate lodges in good standing, or it may be made a representative body. It is officered by a grand master, deputy grand master, grand warden, grand secretary, and grand treasurer, elected annually. Subordinate encampments are composed of scarlet-degree members in good standing in subordinate lodges. The beneficial feature of the order is optional with them. They have the exclusive right to confer the patriarchal, golden rule, and royal pur-

ple degrees, and are officered by a chief patriarch, high priest, senior warden, scribe, treasurer, and junior warden. All past chief patriarchs in good standing are members of grand encampments. The grand encampment meets annually, and is officered by a grand patriarch, grand high priest, grand senior warden, grand scribe, grand treasurer, and grand junior warden, elected annually. The grand lodge and grand encampment derive their revenues from charter fees and percentage on lodge or encampment revenues, or a per capita tax. The grand lodge of the United States, the supreme head of the order there and in Canada, is composed of representatives elected biennially by state and provincial grand lodges and grand encampments. Its elective officers are a grand sire, deputy grand sire, grand secretary, and grand treasurer, elected biennially. Its seat of government is at Baltimore. On Dec. 31, 1873, it had 414,815 lodge members and 80,131 encampment members. The aggregate relief for 1873 was \$1,490,274 72, and the total revenue of subordinates \$4,434,001 08. Its revenue is derived from a direct tax of \$75 for each representative, and the profit on the manufacture and sale of books and supplies. Since 1843 the order in America has had no connection with that in Great Britain. There are organizations of odd fellows in Germany, Switzerland, Australia, South America, and the Hawaiian islands, working under charters received from the American order.

ODENSE, a seaport and next to Copenhagen the most important town of Denmark, capital of the island of Fünen, on a small river which falls into a bay of the same name about a mile from the town, 86 m. W. S. W. of Copenhagen; pop. in 1871, 16,470. It is a prosperous trading town, and one of the oldest places in Denmark. It is the seat of the governor and of a Lutheran bishop, and has a royal castle, a large hospital, and an agricultural and literary society. Its cathedral, founded in 1086 and completed in 1301, contains the tombs of several Danish kings. The town has distilleries, founderies, and woollen mills. It is said to have been founded by Odin.

ODENWALD, a mountain region of Germany, in southern Hesse and the adjoining parts of Baden and Bavaria, between the river Neckar, which separates it from the Black Forest, and the Main, which separates it from the Spessart. It includes the sources of various small tributaries of the Rhine, Neckar, and Main. The beautiful region known as the Bergstrasse, or mountain road, in which are the towns of Bensheim, Darmstadt, and Langen, extends along its W. border; and in various parts of the district there are many interesting ruins of the Roman period. The highest mountain of the Odenwald is the Hardberg, which rises to the height of about 2,000 ft.

ODEON (Gr. ὠδῆιον, from ὠδή, song), a kind of public building used by the ancient Greeks for musical contests, and occasionally for other

purposes. In its general plan it resembled the theatre, and sometimes it served as a place of rehearsal for the choruses. Hence it was smaller than the theatre, and was roofed over. The earliest was that called the Skias in Sparta, built by the Samian architect Theodorus about 650 B. C. There was also an ancient one at Athens, in the S. E. part of the city, near the Ilissus. A much larger and finer one was erected by Pericles at the base of the S. E. part of the acropolis, and in the immediate vicinity of the great theatre. It was burned at the capture of the city by Sulla, and restored by Ariobarzanes II., king of Cappadocia. Athens contained two other odeons, one of which has sometimes been confounded with the Pnyx; the other, a magnificent building, capable of containing 8,000 persons, was erected by Herodes Atticus below the S. W. part of the acropolis, where its ruins are still visible. Many other cities of Greece and its colonies also had buildings of this class. The first odeon in Rome was built by Domitian.

ODER (anc. *Viadrus*), a river of Germany, rising in Moravia, 14 m. E. N. E. of Olmütz, about 2,100 ft. above the level of the sea. It flows N. E. through Austrian Silesia, then through Prussian Silesia and Brandenburg in a tortuous but generally N. W. course to near lat. 53° N., where it changes its direction to N. N. E. and flows through Pomerania and the Grosses Haff into the Baltic. Its whole course is about 550 m., and it is navigable for about 400 m. to Breslau for vessels of 50 tons, and for smaller craft to Ratibor, about 100 m. further. The chief tributaries from the right are the Malapane, Bartsch, and Warthe, and from the left the Oppa, Silesian Neisse, Weistritz, Katzbach, Bober, and Bohemian Neisse. The chief towns on its banks are Ratibor, Kosel, Oppeln, Brieg, Breslau, Glogau, Frankfort, Küstrin, and Stettin.

ODESCALCHI, a noble Italian family, originally from Como.—**MARCO' ANTONIO**, born in Como about 1620, was a cousin of Pope Innocent XI. (Benedetto Odescalchi). He entered the priesthood, and after his cousin's promotion to a cardinalate went to Rome to reside; but he refused all honors and preferments, and devoted himself to works of charity. In 1656 he turned his house into a hospital, and received there the poor and the destitute of all nations. He subsequently bought some adjacent houses, and enlarged his hospital, until it contained 1,000 beds. At his death in 1670 he bequeathed all his property to it, and Innocent XI. not long afterward enlarged it to the capacity of 3,000 beds. It is now known as the hospital of St. Gall.—**TOMMASO**, a kinsman of the preceding, died in 1692. He was appointed almoner of Innocent XI., and determined to erect an asylum for children. He began with 38, and through the liberality of the pope the number was soon increased to 70. In 1686 he laid in the Trastevere the foundation of a large hospital, which he named San Michele, to be occu-

pied solely by vagrant boys, who were to be educated and taught the weaver's trade. At his death he left considerable funds for its further endowment; and its scope and objects have since been largely extended.—The character of the family seems not to have been changed by the lapse of years, for in 1816 an industrial school for poor girls was founded at Rome by CARLO ODESCALCHI, who was cardinal vicar under Gregory XVI., abdicated his rank and became a Jesuit in 1842, and died in 1848.—Another distinguished member of this family was BALTASSARE ODESCALCHI, duke of Ceri, who was born in Rome in 1748, and died there in 1810. He was a great patron of learning, founded in his house the *accademia degli occulti*, and published a volume of poetry and *Istoria dell' accademia de' Lincei* (Rome, 1806).—The present prince BALTASSARE III. (born in 1844) is a devoted partisan of Garibaldi.

ODESSA, a city of Russia, in the government of Kherson, on the shore of a bay in the N. W.

part of the Black sea, between the mouths of the rivers Dniester and Dnieper, 90 m. W. by S. of Kherson, and 385 m. N. N. E. of Constantinople; lat. $46^{\circ} 29' N.$, lon. $30^{\circ} 44' E.$; pop. in 1867, 121,335, including many Greeks, Armenians, Jews, and Italians. It is the seat of the governor general of New Russia and Bessarabia, and of a Greek archbishop. The town stands on a broad plateau, to which it descends almost perpendicularly, and communicates with the beach by a wide stairway of 200 steps. On the edge of the plateau extends a boulevard lined with handsome buildings, and adorned with monuments. In the rear the plateau spreads out into vast steppes almost destitute of vegetation, from which in summer dense clouds of dust are blown. The streets are wide, laid out at right angles, and macadamized, and there are several squares well planted with trees. The town is defended by a fort at the S. E. extremity, and by several batteries along the shore; and the ground be-



Odessa.

tween the town and the harbor is occupied by barracks. The anchorage is good, and an inner harbor capable of accommodating 300 vessels at the quays has been formed by two moles. The port is generally closed by ice two months of the year. The prosperity of Odessa as the principal grain-exporting port of the Black sea has been lately much increased by railway communication with Moscow and St. Petersburg, and by numerous steamboat lines. Since the close of 1873 the city has been supplied with water pumped from the Dniester by powerful works 26 m. distant. The city contains a fine cathedral, 31 churches and 12 synagogues, several hospitals and theatres, an archaeological museum, and a university founded in 1865, which in 1874 had 39

instructors and 257 students. There are about 500 granaries. The number of vessels that arrived in 1872 was 1,253, tonnage 722,979; cleared, 1,286, tonnage 752,816. The trade is mainly in grain, tallow, timber, and wool. In 1872 the exports were valued at \$34,360,000, of which \$25,580,000 was in wheat. The value of imports for the year was \$40,720,000.—In 1792 Catharine II. selected the site of Odessa, and the town was founded in 1794, several regiments being employed in constructing public works. Alexander I. continued the work, Odessa improving chiefly during the governorship of the duke of Richelieu, to whom a monument has been erected. The same czar in 1817 declared the town a free port for 30 years.

ODEVAERE, Josephus Dionysius, a Flemish painter, born in Bruges, Oct. 2, 1778, died in Brussels in February, 1830. He studied painting in Bruges and in Paris, and in 1804 obtained the great prize of the French academy of painting for a picture of the death of Phocion. A pension from the same institution enabled him to study in Rome from 1805 to 1812, and in 1814 he settled in Brussels. Among his paintings are the "Peace of Utrecht" (1814) and the "Battle of Waterloo" (1817).

ODILON BARROT. See **BARROT**.

ODIN, the principal god of Scandinavian mythology. He is said to dwell in Asgard, with the twelve Æsir, many of whom are his children. He rules the heavens; the clouds and the wind are subject to him. Frigga, his favorite goddess, controls nature, and Freyja, who is also sometimes represented as his spouse, is the custodian of the dead. Saga, the goddess of poetry, is Odin's offspring. Being the god of storm, Odin is also the god of war, and directs the course of battles by the Valkyries, virgin goddesses, who take the slain to Valhalla to lead an immortal life of joy and festivity in the company of Odin. As the father of poetry he rewards the real poets with a draught from the wine Odroe-hris. He is the inventor of runic writing. Odin is also an omniscient god, and the ravens Herginn and Muninn, generally perched on his shoulders, are sent out in all directions to inform him of passing events. He was worshipped by all the North Germanic races, and he reappears among the Saxons and Low Germans by the name of Wuotan and Wotan. (See **MYTHOLOGY**).—The Odin of mythology is considered to be connected with Odin the conqueror, who ruled, according to tradition, in the time of Pompey over a portion of Scythia, near the Black sea. Driven out of his territory, he is said to have advanced to the northernmost countries of Europe and Asia, and to have conquered Denmark and the Scandinavian peninsula.

ODOACER, king of Italy, put to death A. D. 493. He was the son of Edecon, a minister of Attila and chief of a tribe of Scyrri. Having led a roving life in Pannonia and Noricum, Odoacer went to Italy, entered the service of the western empire, and speedily rose to high command. After the abdication of Nepos and the elevation to the imperial throne of Romulus, called in derision Augustulus, the Heruli and other barbarian mercenaries demanded as a reward for their services a third part of the lands of Italy. When this was refused, the soldiers chose Odoacer for their leader, who drove Orestes, the father of Augustulus, to Pavia, stormed that city, and compelled Augustulus to abdicate (476). Odoacer made Ravenna his capital, and, though styled king of Italy, never assumed the purple, and had no coins struck in his name. But he ruled the country mildly, enforced the laws, and protected the frontiers from the barbarians

of Gaul and Germany. Although an Arian, he did not molest the church. He ceded the Roman possessions beyond the Alps to Euric, king of the Visigoths, subdued Dalmatia, and defeated and captured Fava, king of the Rugians, in Noricum. At length Theodoric, leader of the Ostrogoths, descended from the Julian Alps, and defeated him near Aquileia and at Verona, and defeated another army encamped on the banks of the Adige. Odoacer retired to Ravenna, and for three years held out against his rival, but finally capitulated on condition of ruling with equal authority with Theodoric over Italy. Only a few days had passed when Odoacer was killed by the order of his associate, and his troops were massacred.

ODOMETER (Gr. *ὁδός*, a road, and *μέτρον*, a measure), an instrument for determining the distances passed over in travelling, also known as pedometer, perambulator, &c. Odometers attached to the wheels of carriages were employed by the ancient Romans. This kind of odometer records by a mechanical contrivance the number of revolutions of a wheel in passing from one place to another. The odometer carried by pedestrians, and designed for recording the number of steps, is generally called a pedometer. It resembles a watch in size and shape, and may be worn in the vest pocket. Its machinery is so constructed that by the rising and sinking of the body with each step a lever is made to vibrate, which moves the index hand connected with it.

O'DONNELL, Leopold (Span. O'DONEL, LEOPOLDO), count of Lucena and duke of Tetuan, a Spanish soldier, born in Santa Cruz, island of Teneriffe, Jan. 12, 1809, died at Biarritz, France, Nov. 5, 1867. He was the son of a Spanish general who was descended from an Irish family that emigrated after the battle of the Boyne. Leopold entered the army, and at the age of 23 attained the rank of colonel. The Carlist war, in which he sided with the young queen, first brought him prominently into notice; and for his services in raising the siege of Lucena he was created count, and received the command of the army of the centre. He subsequently attached himself to the cause of the queen mother Christina, with whom, on the elevation of Espartero to the regency, he was obliged to take refuge in France. In 1841 he was permitted to return to Spain upon pledging his fealty to the government; but he almost immediately headed an insurrection in Navarre. Defeated at Pamplona, he again fled to France. On the overthrow of Espartero in 1843 he returned to Spain, and was appointed captain general of Cuba, where he is said to have amassed a fortune. After his return from Cuba he busied himself again with political intrigues, and on threatening to exert his influence against the government was appointed by Narvaez director general of the infantry, which office he retained till 1851. During the Sartorius ministry he became so deeply implicated against the court and Queen

Christina, that at the commencement of 1854 he was proscribed; but in June he headed a revolt and fought an indecisive battle at Vicalbaro. He then effected a union with the *progressista* party, and issued a manifesto demanding the restitution of the constitution of 1837, the emancipation of Queen Isabella, the perpetual banishment of the queen mother, the amelioration of the laws regulating the elections and the press, the reduction of taxes, and other popular measures. At this crisis Espartero was invited by the queen to form a ministry, and O'Donnell received the portfolio of the war department, and was appointed a marshal. In July, 1856, he succeeded Espartero as president of the council, and at once declared Spain under martial law, closed the cortes, and abolished the national guard. Insurrections followed, which were generally suppressed; but Narvaez plotted against him, and obliged him to resign in October. He returned to power in 1858, and in 1859 was at once prime minister and commander-in-chief of the forces engaged in the war in Morocco. For his services in the latter, which was decided by the victory at Tetuan and the surrender of that city (February, 1860), he was created duke. In February, 1863, he resigned, but was recalled in June, 1865. He now endeavored to restore tranquillity and to carry out many reforms, and procured the acknowledgment of the kingdom of Italy notwithstanding the opposition of the court. The extremists of all parties united against him. Insurrections were frequent, and much blood was shed in suppressing them. In July, 1866, the queen called upon Narvaez to form a new ministry from the reactionary party. O'Donnell went to France, and remained there until his death.

O'DONOVAN, John, an Irish archaeologist, born at Atatee More, county Kilkenny, July 9, 1809, died in Dublin, Dec. 9, 1861. He was employed in the ordnance survey of Ireland, and in 1847 was called to the bar, but never practised. In 1849, on the establishment of Queen's college, Belfast, he was made professor of history and archæology. He was engaged in translating MSS. under the Brehon law commission. For some years before his death he received an annual pension of £50. He published "A Grammar of the Irish Language" (8vo, London, 1845); "The Book of Rights" (1847); and his principal work, "The Annals of Ireland, by the Four Masters, from the earliest Historic Period to A. D. 1616," the Irish text from the original manuscripts with an English translation and notes (3 vols. 4to, Dublin, 1848-'51; 7 vols. 4to, 1856).

ODYSSEY. See HOMER.

CECOLAMPADIUS, or *Oekolampad*, *Johannes*, a German reformer, whose real name was Hussgen or Heussgen, born at Weinsberg, Swabia, in 1482, died in Basel, Nov. 23, 1531. His father was a merchant. He studied jurisprudence at Bologna and theology at Heidelberg, was tutor to the son of the elector pala-

tine, and then held a benefice founded by his parents, but resigned both functions to continue his theological studies. He was an admirer of Erasmus, went to Basel in 1515, and assisted him in his "Annotations on the New Testament." About the end of 1518 he was invited to Augsburg. He found the city excited by a recent conference between Luther and the papal legate, and declared for the reformer. A violent dispute ensued, and he retired in 1520 to a convent of the monks of St. Bridget, near Augsburg. He stood at this time midway between Luther and Rome, desiring a "certain purified Catholicism," but was inclining more and more toward the side of the reformation. He left the convent in February, 1522, went to the castle of Ebernburg, where for a time he was preacher to Franz von Sickingen, and in November was at Basel, where he officiated as curate of St. Martin's. In 1523 the government council appointed him Scripture reader to the university, which refused to acknowledge him. Still he addressed large audiences, and in 1525 was regularly appointed curate of St. Martin's. He led the discussion at the conference in Baden, in 1526, against Eck, and was distinguished there for his mildness and ability. He had written against the celibacy of the clergy, and about 1530 he married Wilibrandis, daughter of a knight of the emperor Maximilian. He supported Zwingli in his dispute with Luther respecting the real presence in the Lord's supper, and published a treatise entitled *De genuina Verborum Domini, Hoc est Corpus meum, Expositione* (1525), in which he maintained the word *corpus* to be only symbolical. He was called the Melancthon of Switzerland. He was a tall, handsome man, of a patriarchal presence. His widow became the wife of his friend Capito, after whose death she married Bucer. Ecolampadius's principal works are: *Annotationes in Genesin*; *Exegemata in Librum Job*; *Commentariorum in Esaiam libri VI.*; *De Ritu Paschali*; and *Quod non sit onerosa Christianis Confessio*. His life has been written by Hess (Zürich, 1791), Herzog (Basel, 1848), and Hagenbach (Elberfeld, 1859).

CECUMENICAL COUNCIL. See COUNCIL.

CEDEMA (Gr. *ῥίδημα*, from *οἰδεῖν*, to swell), a swelling occasioned by the infiltration of serum into the areolar tissue of a portion of the body. The term *cedema* generally refers to cases in which the serous infiltration is local, as *cedema* of the face, of the extremities, of the lungs; *anasarca* to those in which it is general, invading the areolar tissue of the whole body. Anything which interferes with the return of the venous blood from a part may produce *cedema*; thus in pregnant women the pressure of the uterine tumor upon the great veins within the abdomen may cause *cedema* of the lower extremities; and in feeble persons the same result follows the long maintenance of the upright position, the blood having to return against the force of

gravity. Obliteration of any of the large venous trunks by adhesive inflammation is followed by œdema of the parts whose blood was returned by the obliterated trunk; thus phlegmasia dolens is caused by inflammation and plugging up of the femoral or iliac veins. The pressure of an aneurism or other tumor within the chest, upon the vena cava or vena innominata, may produce œdema of one half or the whole of the upper part of the body. Paralyzed limbs frequently become œdematous from the venous circulation no longer being aided by the contraction of the muscles of the part. Certain conditions of the blood, such as exist in chlorosis and scurvy, are favorable to the occurrence of œdema. In all these instances the œdema is of a passive kind; but the same symptom occurs as an attendant on some forms of inflammation, particularly a variety of erysipelas, hence termed œdematous erysipelas. In all instances œdema is simply a symptom produced by different causes, and is to be treated according to the cause by which it is produced. Two varieties of œdema, that of the glottis and that of the lungs, from their importance arising from the nature of the organs affected, deserve special mention.—Œdema of the glottis may occur from exposure to cold and moisture, as a consequence of tonsillitis and other affections, the inflammation extending to the larynx, or in the course of various diseases, as erysipelas, typhoid fever, &c. The patient is conscious of an increasing impediment in his respiration, and of a sense of stricture about the larynx. There is a dry hoarse cough coming on in paroxysms, with fits of suffocation, while the voice is hoarse, whispering, and finally extinct. Inspiration is prolonged and difficult, while expiration is comparatively unaffected. Sometimes, but not invariably, there is soreness of the throat and difficulty of swallowing. The pulse, at first unaffected, as the difficulty of breathing increases becomes small and frequent, and the body is bathed in perspiration. Death from suffocation sometimes takes place a few hours after the commencement of the attack. On post-mortem examination the cellular tissue underneath the mucous membrane lining the glottis is found infiltrated by serum, narrowing the opening of the glottis and causing a sort of valvular action in inspiration. When violent the disease rarely leaves much time for treatment. Schönlein of Berlin first suggested the operation, but Dr. Gurdon Buck of New York was the first to carry it into effect, and has relieved numerous cases of this affection by nicking the œdematous mucous membrane, and thus giving exit to the effused serum which is the cause of the difficulty. When Dr. Buck's operation does not succeed, recourse must be had to tracheotomy.—Œdema of the lungs occurs in heart disease as a consequence of the embarrassed condition of the circulation through the lungs, in albuminuria (see ALBUMINURIA), in typhus and typhoid fevers, in anæmia, and in

pneumonia and bronchitis. Its symptoms are difficulty of breathing, in some cases extreme, and a sensation of weight or constriction in the chest. There is teasing cough with a watery and sometimes viscid expectoration. On physical examination the percussion note is but slightly affected; auscultation gives a smooth, moist, fine, sub-crepitant rhonchus. The treatment is that of dropsy.

ŒDENBURG (Hung. *Soprony*). **I.** A county of W. Hungary, bordering on Lower Austria and the counties of Wieselburg, Raab, Veszprém, and Eisenburg; area, 1,277 sq. m.; pop. in 1870, 230,158. The western and northern districts are mountainous and wooded, while the southern and eastern are level and fertile. It is watered by the rivers Raab, Rabnitz, and Leitha. One of the largest lakes of Hungary, the Neusiedler lake, is in this county. The chief products are wheat, fruit, wine, tobacco, and coal. **II.** A town, capital of the county, near the Neusiedler lake, on a branch of the Vienna and Cilli railway, 37 m. S. S. E. of Vienna; pop. in 1870, 21,108, chiefly Germans. It is neatly built, and has several fine churches, both Catholic and Lutheran, colleges of both creeds, convents, hospitals, barracks, a military academy, a theatre, and a curious watch tower which anciently formed part of its fortifications. It has manufactures of cotton, woolen, &c., and an active trade in wine.

ŒDIPUS, a mythological king of Thebes, son of Laius and Jocasta. An oracle having informed Laius that he should be killed by his son, the infant was exposed on Mt. Cithæron with his feet pierced and bound together. He was found by a shepherd and brought to King Polybus of Corinth, who being childless adopted him and called him Œdipus from his swollen feet. He grew up in ignorance of his birth, and once being taunted with not being the son of the king, he consulted the oracle at Delphi, which answered: "Avoid the soil of thy country, or thou wilt be the murderer of thy father and the husband of thy mother." Supposing Corinth was meant, he determined not to return. On the road between Delphi and Daulis he met Laius, and was ordered by the charioteer to make way; an affray ensued, in which he killed both his father and the charioteer. At this time the sphinx was laying waste the territory of Thebes, proposing a riddle to every passer-by, and devouring all who were unable to solve it. The Thebans offered the crown and the hand of Queen Jocasta in marriage to him who should free the country from the monster. Œdipus undertook the task, and the following riddle was given him: "A being with four feet has two feet and three feet, and only one voice; but its feet vary, and when it has most it is weakest." Œdipus answered that it was man, who in infancy crawls upon all-fours, in manhood walks erect, and in old age supports himself by a staff. The sphinx hereupon destroyed herself, and Œdipus obtained the crown and married his mother, who bore

him two sons, Eteocles and Polynices, and two daughters, Antigone and Ismene. A pestilence desolating the land on account of this incestuous alliance, the oracle ordered the expulsion of the murderer of Laius; and a proclamation was issued announcing a curse upon the unknown criminal, and declaring him an exile. Œdipus was informed by the prophet Tiresias that he himself was the parricide and the husband of his mother. Jocasta hanged herself, and Œdipus put out his eyes. After this, according to one form of the legend, Œdipus was driven from Thebes by his sons and Creon, his brother-in-law, and under the guidance of his daughter Antigone went to Attica. According to another, he became dependent upon his sons, on whom he imprecated a curse, praying to the gods that there might be endless war between them, and that they might perish each by the hand of the other. After Eteocles and Polynices had slain one another, Creon succeeded to the throne and drove out Œdipus, who finally reached the groves of the Eumenides, near Colonus in Attica, where he was received with distinguished honor by Theseus. There he died, and his burial place was concealed by the Eumenides, whose favor he had conciliated. The tragedies of Œschylus and Euripides founded upon this legend are lost; but two by Sophocles remain, entitled "Œdipus Tyrannus" and "Œdipus at Colonus." Seneca also wrote one, and in modern times Corneille and Voltaire.

OEHLENSCHLÄGER, Adam Gottlob, a Danish poet, born in Copenhagen, Nov. 14, 1779, died there, Jan. 20, 1850. His father was steward of the royal palace of Frederiksborg, where the son spent his early life. He was sent to school at Copenhagen at the age of 12, and soon after began to write verses and plays which were performed by himself and his schoolmates. His acquaintance with the brothers Oersted led to his studying law in the university of Copenhagen. In 1803 he published a volume of poetry, containing the play of "The Eve of St. John," which with his drama of "Aladdin" procured him a travelling stipend from the government. In Germany he mastered the German language, into which he translated his works. At Halle he wrote "Hakon Jarl," the first and one of the finest of his purely Scandinavian tragedies (English translation by F. C. Lascelles, London, 1874); and at Paris he produced "Palnatoke," considered by some his masterpiece, and "Axel and Valborg," all dramas of powerful interest. At Rome, where he became intimate with Thorwaldsen, he composed "Correggio," which became very popular on the Danish and German stage (English translation by Theodore Martin, 1854). Oehlenschläger returned to Denmark in 1810, and soon afterward became professor of æsthetics at the university of Copenhagen. His works include novels, poems, translations, and a great variety of miscellanies. On his first visit to Sweden in 1829 he received a brilliant

ovation, and his 70th birthday was celebrated with a grand festival in Copenhagen. Of his 24 tragedies, on which his fame chiefly rests, 19 are devoted to Scandinavian subjects. In addition to those mentioned, the most striking are "Canute the Great," "The Varangians in Constantinople," "Land Found and Lost," illustrating the early voyages of the Northmen to America, "Dina," and "Tordenskjold." In his *Nordens Guder* ("Gods of the North"), published in 1819, he collected the scattered legends of the Eddas. An English metrical translation of this by W. E. Frye was published in Paris in 1845. Oehlenschläger also translated the "Midsummer Night's Dream" and Beskow's Swedish dramas into Danish, and Holberg's "Danish Theatre" into German. His collected works in Danish, including his *Erindringer* or "Recollections," an autobiography, amount to 41 volumes; those in German of all kinds to 21. A critical edition of his *Poetiske Skrifter* was published by Liebenberg in Copenhagen (32 vols., 1857-'65), and a German edition of his *Lebenserinnerungen* at Leipsic (4 vols., 1850-'51).

OELS, a town of Prussian Silesia, in a valley on the Oelsa, 10 m. N. E. of Breslau; pop. in 1871, 8,124. It contains a mediæval castle, in a park surrounded by a wall and moat, with gardens and a picture gallery; a Catholic and four Protestant churches, a synagogue, a Protestant gymnasium, a theatre, and a retreat for the widows of clergymen. There are extensive manufactories of cloth. In the vicinity are the villages and ducal villas of Wilhelminenort and Sibyllenort. It is the capital of a mediatized principality, formerly a duchy, including Oels-Bernstadt, besides the circles of Oels and Trebnitz, the domain of Medzibor, and the town and district of Konstadt; aggregate pop. about 170,000. The duchy of Oels originally belonged to the dukes of Silesia, and after passing through many hands the right of succession to it was conceded by Frederick the Great in 1785 to the duke Frederick William of Brunswick, who fell in 1815 in the battle of Quatre-Bras. His son Charles ceded it in 1824, under the name of Brunswick-Oels, to his brother William, the present duke of Brunswick.

GENOTHERA (Gr. *olvas*, wine, and *θήρα*, a hunt, the roots of some species being supposed to provoke a relish for wine), a genus of plants known as evening primrose, and belonging to the family *onagraceæ*. The family is showy, and includes the well known *Fuchsia*, *gaura*, *Clarkia*, and others cultivated for their flowers. The genus *anthera*, except one Tasmanian species, is purely extra-tropical American, and includes about 100 species, all herbs, or at most slightly woody at base; the flowers have a four-lobed calyx, four petals, eight stamens, and one style, with a knob-like or four-lobed stigma; the parts of the flower, being adherent to the ovary, appear as if situated at the top of it; the fruit is sometimes woody, variously shaped, and usually four-celled, with numerous seeds. The

common evening primrose (*Æ. biennis*) is found almost all over North America, and being so widely distributed presents a number of well marked varieties; it is a biennial with a strong fleshy root and stems 3 to 5 ft. high; leaves



Lamareck's Evening Primrose (*Enothera biennis*, var. *Lamareckiana*).

ovate-lanceolate, often obscurely toothed and hairy or nearly smooth; the flowers are in a terminal leafy spike, large, yellow, and fragrant. In this as in others of the genus, the flowers open only at twilight, and fade the next morning; the opening takes place suddenly. Several varieties of this are in cultivation. The largest and finest, called *Æ. Lamareckiana*, branches abundantly at the base, and forms a fine pyramidal plant with very numerous flowers 3 or 4 in. in diameter; the sudden opening of these at nightfall is strikingly beautiful. The com-



Missouri Evening Primrose (*Enothera macrocarpa*).

mon form is cultivated in Europe, especially in Germany, for its roots, and known as German rampion; the root is 10 to 12 in. long, sometimes with lateral fibres and very white

within; its cultivation is like that of the parsnip and similar vegetables. The roots, which have a nutty flavor, are boiled and dressed as salad, or served with white sauce like salsify, and are regarded as more easily digestible by weak stomachs than most other vegetables. In this country it is hardly known in cultivation. The Missouri evening primrose (*Æ. Missouriensis*) has a large fleshy perennial root, from which proceed numerous prostrate spreading stems, bearing ashy-green leaves and bright yellow flowers 4 to 6 in. across; this (sometimes called *Æ. macrocarpa*) is the largest-flowered of all the species. There is a group of white-flowered ænotheras which turn rose-colored in fading; some prostrate species of this group are very abundant on the western plains; during the day their dull leaves are not noticeable, but as night approaches the traveller is surprised to see the sterile soil suddenly bloom out with a profusion of these flowers. Another group consists of yellow-flowered species which open in bright sunshine, and are called sun-drops; *Æ. fruticosa* and *Æ. linearis*, both common wild species, and occasionally cultivated, are examples of these. There is a very distinct set of species on the Pacific coast, which from some differences in the structure have been placed in a different genus, *Godetia*, a name by which they are retained in floricultural works and seed catalogues, though botanists regard them as a section of *ænothera*. These have white, rose-colored, or purple petals, which are often fringed on the margin. Not only are the original species cultivated, but several well marked varieties have been obtained by cultivation. The *Æ. grandiflora*, which has recently been introduced into cultivation under the name of *Godetia Whitneyi*, is a native species having bluish flowers with a dark crimson spot in the centre, and is quite as showy as any of the florists' varieties; the *godetias* are all annuals.

OERSTED, Anders Sandöe, a Danish statesman, born at Rudkjöping, in the island of Langeland, Dec. 21, 1778, died in Copenhagen, May 1, 1860. He was educated at the university of Copenhagen, where he became intimate with Oehlenschläger, whose sister he married. He attained eminence as a jurist, held various public offices, and in 1825 became attorney general. He was a member of the cabinet from 1841 to 1848, and in 1853 became prime minister. On the question of the king's right to grant new constitutions to Holstein and Schleswig without consulting the diet, the ministry was overthrown in December, 1854. Articles of impeachment were then preferred against Oersted and his colleagues, but they were acquitted. He wrote *Eunomia* (4 vols., 1815-'22); *Haandbog over den danske og norske Lovkyndighed* (6 vols., 1822-'35); an autobiography (4 vols., 1851-'7); and several works on philosophy.

OERSTED, Hans Christian, a Danish natural philosopher, brother of the preceding, born at Rudkjöping, Aug. 14, 1777, died in Copen-

hagen, March 9, 1851. He was the son of a druggist. At the university of Copenhagen he took a prize for an essay on "The Limits of Poetry and Prose." He had become imbued with the modern German philosophy through the lectures of Steffens, and on taking his doctor's degree presented a dissertation on the "Architectonics of Natural Metaphysics," a study of the laws of physics and their higher relations as the products of reason. In 1800 he took charge of a pharmacy, devoted his attention to galvanism, and made important discoveries with respect to the action of acids during the production of galvanic electricity. In 1801-'3 he studied and travelled in Germany, France, and the Netherlands, and on returning to Copenhagen lectured on electricity and cognate sciences. A selection from his scientific papers written about this time has been published under the title of "The Soul in Nature" (London, 1852). In 1806 he became professor of physics in the university of Copenhagen, and in 1809 published the first edition of his "Manual of Mechanical Physics." In 1812 he revisited Germany, and published at Berlin a work tending to show the identity of magnetism and electricity. His discovery of this identity was made in the winter of 1819-'20. (See *ELECTRO-MAGNETISM*, vol. vi., p. 513.) In July, 1820, Oersted promulgated his discovery in a Latin tract entitled *Experimenta circa Efficaciam Conflictus Electrici in Acum Magneticam*. The French institute presented Oersted with a prize worth 3,000 francs; the royal society of London gave him the Copley medal; and by common consent he was elevated to the first rank of scientific men. He made scientific journeys at intervals to various parts of Europe, and founded the magnetic observatory of Copenhagen, and also the Danish society for the diffusion of natural science. In 1844 appeared the second edition of his "Manual of Mechanical Physics," which contained accounts of his experiments on the compressibility of water and air. He also devoted some time to politics and light literature, and published a poem entitled "The Balloon." The 50th anniversary of his connection with the university was celebrated with a national jubilee, Nov. 7, 1850. Throughout his scientific career Oersted labored to show that the laws of nature must harmonize with reason, even representing the practice of science to be a religious worship. As a lecturer he possessed great merit, and was one of the first to give popular lectures to ladies on scientific subjects, and to urge the establishment of female colleges. A complete edition of his works was published in Copenhagen (9 vols., 1850-'51). Several of them have been translated into foreign languages.

OERTEL, Philipp Friedrich Wilhelm (better known by his *nom de plume* W. O. von Horn), a German author, born at Horn, near Simmern, Aug. 15, 1798, died in Wiesbaden, Oct. 14, 1867. He was the son of a clergyman, studied

theology at Heidelberg, was in charge of a parish at Mannebach from 1820 to 1835, was ecclesiastical superintendent at Sobernheim from 1835 to 1863, and subsequently resided at Wiesbaden. He was a voluminous writer of popular stories, and his *Gesammelte Erzählungen* (13 vols., Wiesbaden, 1850-'59) has passed through numerous editions.

OESSEL, an island in the Baltic, at the mouth of the gulf of Riga, in the Russian government of Livonia; length about 60 m., breadth from 3 to 50 m.; area, 1,200 sq. m.; pop. about 46,000, mainly Lutherans. It has a bold, high coast, and a diversified surface. The climate is more temperate than on the mainland, but violent storms are frequent in spring and autumn. The soil is not naturally fertile, but is watered by many small streams. A great part of the island is covered with forests, and much of it is used as pasture. Grain is raised for exportation. The only important manufacture is tar. The fisheries, chiefly of seals, are valuable. Oesel once belonged to the Teutonic knights, but was seized by the Danes at an early period, and ceded by them to Sweden in 1645. In the beginning of the 18th century Russia took possession of it, and in 1721 it was formally ceded to that power. Chief town, Arensburg.

OESTERLEY, Karl, a German painter, born in Göttingen in 1805. He studied in Göttingen, Dresden, and Italy, and became a professor at Göttingen in 1829. He subsequently perfected his art in Düsseldorf, Munich, and Paris, and became painter to the court of Hanover. He resigned his chair at Göttingen in 1863. Among his best known cartoons are "The Daughter of Jephthah," "Lenore," illustrating Bürger's ballad, "The two Brides," "The awakened Dornröschen" (1861), "Hans Memling" (1865), and many altarpieces.

OETINGER, Friedrich Christoph, a German theologian, born at Göppingen, Württemberg, May 6, 1702, died at Murrhardt, Feb. 10, 1782. He was educated at Tübingen, Jena, and Leipsic, was for a time tutor at Tübingen, and assisted Count Zinzendorf in his project of translating the Bible. In 1738 he was appointed pastor at Hirschau. He became a convert to the doctrines of Jacob Boehm, and attempted to arrange a system of theology on the mystical interpretation of Scripture. In 1765 he published his *Theologia ex Idea Vitæ Deducta* (Frankfort; translated into German by Hamburger, 1852), in which he set forth his peculiar notions. He assails the philosophy of Wolf because he has converted the terms life, kingdom, spirit, to which the Scriptures attach a definite meaning, into abstract ideas, from which he develops a system of idealism which resolves everything into mere symbolism. He translated several of Swedenborg's works into German (2 vols. 8vo, Leipsic, 1765). His own views were expressed in his "Heavenly and Earthly Philosophy," which was condemned by his ecclesiastical superiors; but the duke of Württemberg took him under his protection,

and he was made prelate and ecclesiastical councillor at Murrhardt, a post which he held until his death. He exerted a great influence on the spiritual thought of Germany. He wrote several philosophical and cabalistic works, and devoted much time to the study of the transmutation of metals. His autobiography was published at Stuttgart in 1845, and a complete edition of his works has been collected and edited by Ehmann (Reutlingen, 1852 *et seq.*), who published also his life and letters in 1859.

OETTINGEN, a mediatised county of Germany, which existed in the Riesgau, Swabia, as early as the 13th century, and is divided at present between the Spielberg and Wallerstein lines, the territory belonging partly to Bavaria (since 1806) and partly to Württemberg (since 1810). Wallerstein, the principal town of the latter branch, is situated in the Bavarian district of Swabia and Neuburg, and celebrated for its palace and its library of 100,000 volumes.—Prince LUDWIG KRAFT ERNST VON OETTINGEN-WALLERSTEIN, a Bavarian statesman, born at Wallerstein Jan. 31, 1791, died in Lucerne, Switzerland, July 22, 1870. He lost his seat in the Bavarian diet in 1823, on account of his opposition to the government, and his right to the succession as prince by marrying in the same year the daughter of his gardener. In 1828 he was restored to his seat in the diet, and in 1831 he became minister of the interior, but was soon succeeded by his adversary Abel. He was employed in diplomatic missions in 1843-'4, and formed with Berks in 1847 the so-called Lola cabinet. Subsequently he figured in the chamber as a liberal, but his influence was impaired by his want of consistency, and he was arrested for debt. On his release in 1863 he was obliged to seek refuge in Lucerne. His nephew, Prince Charles (born in 1840), is the present heir of the house.

OETTINGER, Eduard Maria, a German author, born of Jewish parents in Breslau, Nov. 19, 1808, died June 26, 1872. He completed his education in Vienna, adopted the Roman Catholic religion, and became a journalist, editing various journals, mostly humorous, in Berlin, Munich, Hamburg, Mannheim, and Leipsic. He wrote several romances, including "The Ring of Nostradamus" (1838), "Uncle Zebra" (1842-'3), "The Grammar of Marriage" (1844), "Sophie Arnould" (1847), "Potsdam and Sans-Souci" (1848), and "Jerome Napoleon and his Capri" (1853). Among his bibliographical works are *Archives historiques* (1841), and *Bibliographie biographique* (1850; enlarged ed., Brussels, 1854). His last years were spent in poverty and blindness. He left an unfinished work entitled *Le moniteur des dates*.

OFEN. See BUDA.

OFFA, a king of Mercia, Britain, who reigned for about 40 years in the second half of the 8th century. He conquered various territories, and compelled the king of Kent to acknowledge his authority. Charlemagne called him the most powerful of the Christian kings of the

West, and maintained friendly relations with him except during a short period when the traders in Offa's dominions committed depredations upon Frankish merchants. At the instigation of Cynedrida, his wife, he put to death Ethelbert, king of East Anglia, and seized his states. He soon died, overcome by remorse, and was succeeded by his son Egferth, who reigned only a few months. Offa compiled the laws of his dominions, which are mostly included in the Anglo-Saxon code of Alfred the Great.—See "Essay on the Life and Institutions of Offa," by Mackenzie (London, 1840).

OFFENBACH, the chief manufacturing town of the grand duchy of Hesse, Germany, on the S. bank of the Main, 4 m. E. of Frankfort; pop. in 1871, 22,691. It contains a castle, and has manufactories of cottons and woollens, carriages, cards, musical instruments, jewelry, and other wares.

OFFENBACH, Jacques, a French composer, born of German-Jewish parents in Cologne, June 21, 1819. He was a student at the Paris conservatory from 1835 to 1837, and began his career as a player upon the violoncello. His first published compositions were music to La Fontaine's fables. In 1847 he became leader of the orchestra at the Théâtre Français. In 1855 he opened the Bouffes Parisiens on the Champs Élysées as a summer theatre, transferring his company in the winter to the Théâtre de Comte in the passage Choiseul. In 1873 he became director of the Gaité theatre. His career since the opening of the Bouffes Parisiens has been one of great prosperity and popularity. His *Orphée aux enfers* ran for 300 successive nights when first produced, and his operas have been performed throughout Europe and America. For the copyright of his spectacular opera bouffe "Whittington and his Cat," produced at the Alhambra theatre, London, Christmas, 1874, he received £3,000. He was the first to bring to the treatment of burlesque the ingenuity and elaboration which other composers have given to more serious works. His rank as a composer is by no means proportionate to the popularity he has obtained. His training was incomplete; his melodies, though rhythmical, are trivial; and the structure of his operas is founded for the most part upon dance measures, bright and pleasant, but of little musical value. On several occasions he has endeavored to produce a higher class of compositions, and he wrote as *opéras comiques* *Barcouf* and *Robinson Crusoe*. But he failed in these attempts, and returned to the opera bouffe. His best known productions in addition to those above named are *La belle Hélène* (1864), *Barbe-Bleue* (1866), *La grande duchesse* (1867), *La Périhole* and *Geneviève de Brabant* (1868), *Les brigands* and *La princesse de Trébizonde* (1869), *La jolie parfumeuse* (1873), and *Madame l'archiduc* (1874).

OFFENBURG, a town of Baden, at the entrance of the Kinzig valley, 40 m. S. W. of Carlsruhe; pop. in 1871, 5,756. It has a Catholic gymna-

sium, a female seminary in connection with a convent, and an active trade in grain and wine. A statue of Sir Francis Drake was erected here in 1853, in honor of his introduction of potatoes into Europe. In the vicinity is the renovated castle of Ortenberg. Offenburg was once a free imperial city. It suffered much from wars in the 17th century. The French were defeated here by the imperialists, Sept. 24, 1707.

OFFERDINGEN, Heinrich von, a German minstrel, who flourished about 1200. He was a native of Saxony, but is believed to have spent much of his life at the court of Austria, and is one of the reputed authors, according to Simrock, of the second part of the *Wartburgkrieg*, and according to Spaun of the *Nibelungenlied*; but he had nothing to do with the latter, and his connection with the former and other works is also contested. He is represented in the poem of the *Sängerkrieg* as one of the great minstrels in the poetical contest at the Wartburg, and his fame has been revived in modern times by Novalis, who made him the hero of an unfinished romance.

OG, king of Bashan, one of the two kings of the Amorites who withstood the invasion of the Israelites under Moses. He was utterly defeated at Edrei, his threescore cities were taken, and his kingdom was given to the half tribe of Manasseh. He was a giant, his iron bedstead, which was kept in Rabbath-Ammon, being 9 cubits long and 4 broad. Many stories in regard to his great size are also found in rabbinical and Mohammedan writers.

OGDENSBURG, a city of St. Lawrence co., New York, port of entry of the district of Oswegatchie, situated on the St. Lawrence river, at the mouth of the Oswegatchie, 72 m. below Lake Ontario and 4 m. above the rapids, at the terminus of the Rome, Watertown, and Ogdensburg railroad, and of a division of the Vermont Central railroad, 175 m. N. W. of Albany; pop. in 1860, 7,409; in 1870, 10,076, of whom 4,072 were foreigners; in 1874, 11,340. It is regularly laid out and handsomely built, and the streets are lined with maples, from which circumstance it derives the title of "Maple City." It is lighted with gas, and is supplied with water on the Holly plan by 14 m. of water mains. The public buildings are the town house, eight large brick and stone school houses, six churches, and the edifice (costing \$275,000) occupied by the custom house, post office, and the United States court. Three ferry steamers run to Prescott, Canada, on the opposite bank of the St. Lawrence, and there is a line of 23 steamers to Chicago. The commerce of Ogdensburg is important. The receipts of grain amount to about 5,000,000 bushels annually, and of lumber to about 75,000,000 feet. The value of exports to foreign ports (Canada) for the year ending June 30, 1874, was \$741,497; of imports from Canada, \$1,977,751. The entrances in the foreign trade were 434, of 88,880 tons; clearances, 434, of 88,856 tons; entrances in

the coastwise trade, 620, of 176,957 tons; clearances, 620, of 177,897 tons; belonging in the district, 35 vessels, of 3,636 tons. The water power is excellent, and is employed in the production of flour, rough and planed lumber, shingles, and staves. About 300,000 barrels of flour and 10,000,000 feet of lumber are annually manufactured. There are three private banks, a public school library of 3,500 volumes, and three newspapers. The public schools are graded and have an average attendance of 1,020 pupils. Ogdensburg is the residence of a Roman Catholic bishop. It was founded in 1749, incorporated as a village in 1817, and as a city in 1868.

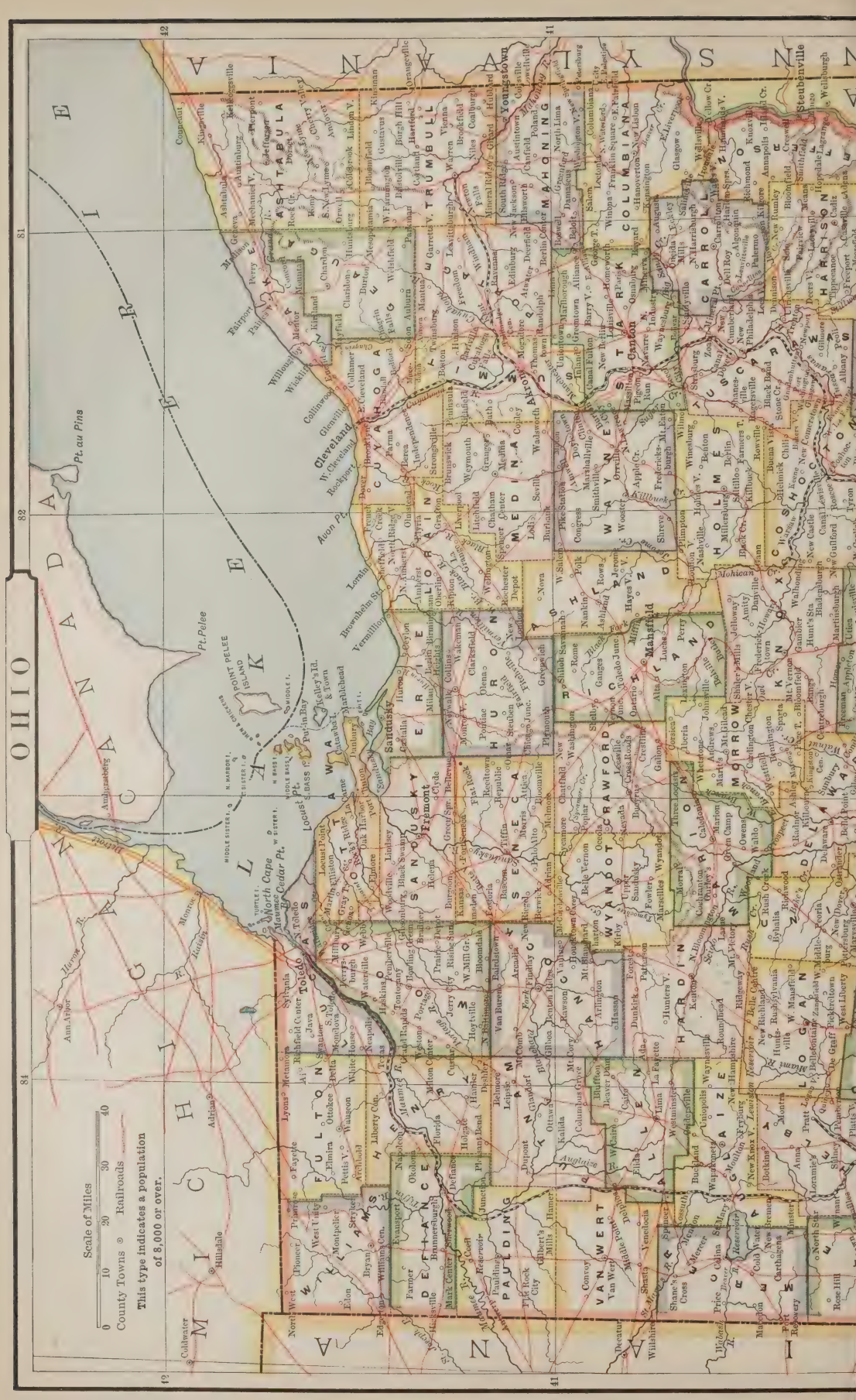
OGEMAW, a N. E. county of the S. peninsula of Michigan, drained by Rifle river and other streams; area, 576 sq. m.; pop. in 1870, 12. The surface is rolling, with a general slope to the S. E. The soil is fertile.

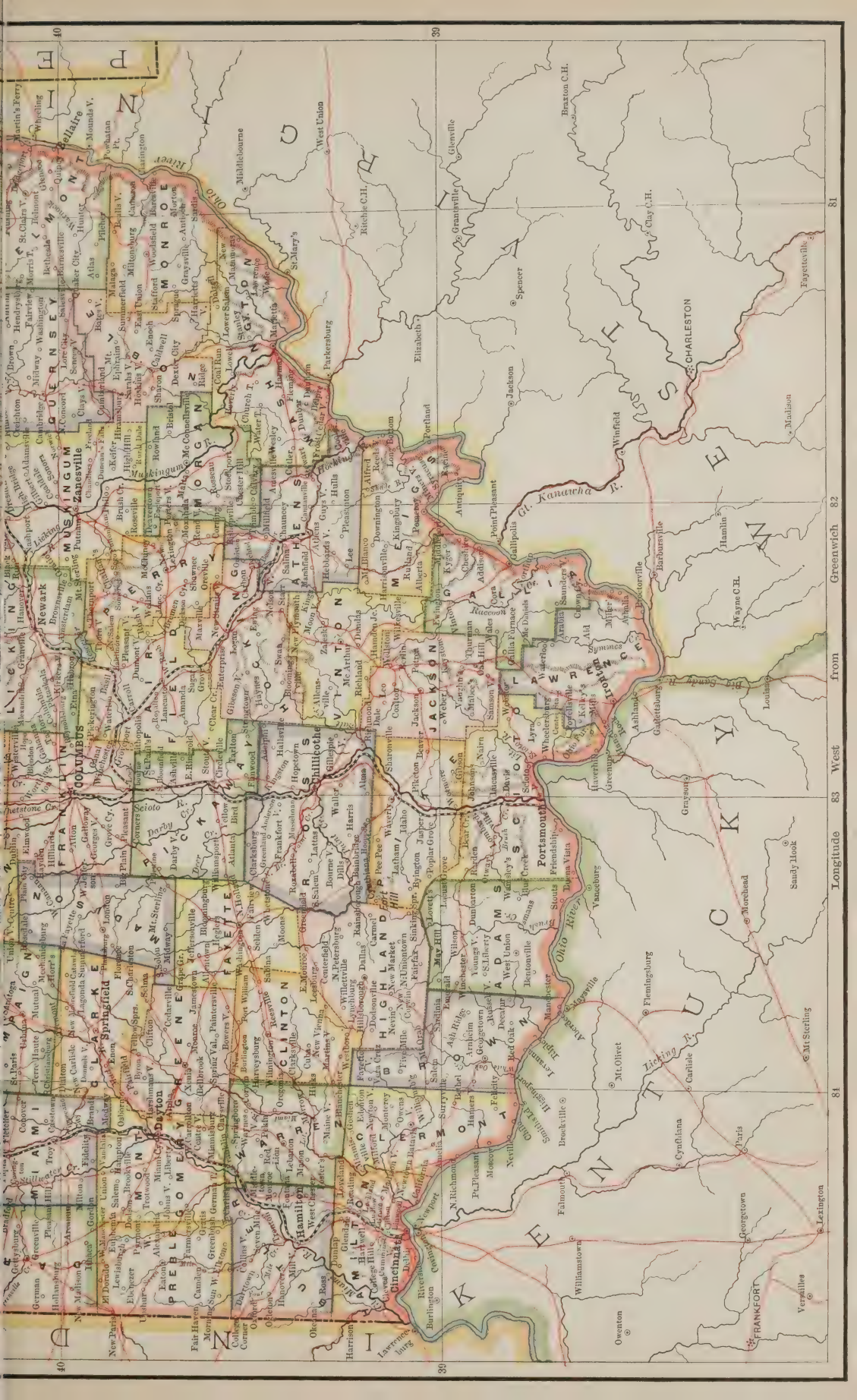
OGGIONE, or **Uggione**, **Marco da**, an Italian painter, born at Oggione, near Milan, about 1470, died in 1530. He was a pupil of Leonardo da Vinci. His chief works are the frescoes executed for the church della Pace in Milan, but he is perhaps best known by his celebrated copy of Da Vinci's "Last Supper," executed about 1510, now in the royal academy in London.

OGILBY, John, a Scottish poet, born in Edinburgh in 1600, died in London, Sept. 4, 1676. While a boy he removed with his parents to London, where he subsequently became a dancing master. Through the earl of Strafford he was appointed master of the revels in Ireland, and built a theatre in Dublin; but the civil wars having ruined his prospects, he returned to England, and studied at Cambridge. He published various metrical translations, including one of Homer, which was a favorite with Pope in his younger days. At the restoration he was reappointed master of the revels in Ireland, but was ruined by the fire of London. He published nine volumes of a descriptive "Geography of the World," to be disposed of by lottery; of these, "America" (fol., London, 1671) is curious and valuable.

OGILVIE, John, a Scottish poet, born in Aberdeen in 1733, died at Midmar, Aberdeenshire, in 1814. He was educated at Marischal college, Aberdeen, and in 1759 was settled as minister of the parish of Midmar. He wrote "The Day of Judgment," a poem (1758); "Providence, an Allegorical Poem" (1763); and "Solitude, or the Elysium of the Poets" (1765). A collection of his poems was published in 1769. His critical and theological works include "An Inquiry into the Causes of Scepticism and Infidelity in all Times" (1783), and "The Theology of Plato compared with the Principles of the Oriental and Grecian Philosophers" (1793).

OGLE, a N. county of Illinois, intersected by Rock river; area, about 576 sq. m.; pop. in 1870, 27,492. The surface is rolling, and the soil very fertile. It is traversed by the Illinois Central and the Chicago and Iowa railroads.





The chief productions in 1870 were 502,618 bushels of wheat, 157,504 of rye, 1,787,066 of Indian corn, 141,540 of oats, 317,462 of barley, 207,784 of potatoes, 95,138 lbs. of wool, 425,700 of flax, 875,056 of butter, 43,422 of cheese, and 41,637 tons of hay. There were 13,525 horses, 12,932 milch cows, 21,965 other cattle, 18,295 sheep, and 33,489 swine; 10 manufactories of carriages and wagons, 1 of dressed flax, 7 of saddlery and harness, 8 of tin, copper, and sheet-iron ware, 2 flour mills, and 1 planing mill. Capital, Oregon.

OGLETHORPE, a N. E. county of Georgia, bounded N. by the Broad river and two of its branches, and S. W. by the Oconee; area, 480 sq. m.; pop. in 1870, 11,782, of whom 7,141 were colored. It has a hilly surface and a generally fertile soil. It is intersected by the Athens branch of the Georgia railroad. The chief productions in 1870 were 28,958 bushels of wheat, 181,386 of Indian corn, 22,880 of oats, 21,532 of sweet potatoes, 106,249 lbs. of butter, and 5,907 bales of cotton. There were 1,438 horses, 7,538 cattle, 4,314 sheep, and 9,354 swine. Capital, Lexington.

OGLETHORPE, James Edward, founder of the colony of Georgia, born in London, Dec. 21, 1688, died at Cranham hall, Essex, June 30, 1785. He was commissioned an officer in the queen's guards in 1714, and as one of Prince Eugene's aides-de-camp participated in the campaigns against the Turks in 1716-17, and took an active command at the celebrated siege and battle of Belgrade. He returned in 1722 to England, and in the same year was elected to parliament from Hazelmere, which he represented for 32 years. He made a successful effort in parliament to improve the condition of the poor debtors confined in the London prisons, and projected a plan for a colony in North America to serve as an asylum for the oppressed Protestants of Germany and other continental states, "and for those persons at home who had become so desperate in circumstances that they could not rise and hope again without changing the scene and making trial of a different country." The unoccupied territory between Carolina and Florida was selected for the experiment. In June, 1732, 21 "trustees for founding the colony of Georgia" were incorporated by letters patent; and in January, 1733, a party of colonists, under the guidance of Oglethorpe, who was appointed governor of the colony, arrived at Charleston. The narrative of his career in Georgia, until his final return to England in 1743, will be found in the article **GEORGIA**. During the invasion of the young pretender in 1745 he was appointed a major general. His conduct was repeatedly the subject of official inquiry, but he was acquitted. In 1765 he received the rank of general of all his majesty's forces.

OGLIO (anc. *Ollius*), a river of northern Italy, flowing through Lombardy. It rises in the Rhaetian Alps at the foot of Mount Tonale, in the N. E. part of the province of Bergamo,

flows S. W. and afterward S. E., passes through Lake Iseo, and afterward separating the provinces of Bergamo and Cremona from those of Brescia and Mantua, and receiving the waters of the Mella and the Chiese from the north, joins the Po near Borgoforte, and 10 m. S. W. of Mantua. It is about 150 m. long.

OGOBAY, or **Ogowai**, a large river of western Africa, near lat. 1° S., flowing into the Atlantic through an extensive delta, of which the principal branches are the Nazareth, with its mouth in lat. 0° 41' S.; the Mexias, in lat. 0° 56' S.; and the N'pooloonai, reaching the sea in lat. 1° 17' S. through the mouth of the Fernand Vaz, with which river it unites about 10 m. inland. It was discovered by Du Chailu in 1856, and is formed, about 100 m. from the seaboard and about 40' S. of the equator, by the junction of the Okanda, supposed to be the main stream, from the northeast, with the N'gooyai, from the south. It has been explored by French government expeditions as far as this point, up to which it is navigable in the rainy season. Even in the dry season, when its level is 15 ft. lower, it is practicable for light-draught steamers up to Goombi, a town of the Camma people, 95 m. from the mouth. About 40 m. from the coast the Ogo bay receives the outflow of a large lake 10 m. wide, communicating with it on the S. bank by a stream 5 m. long. According to Du Chailu, the Okanda and N'gooyia, which unite to form the Ogo bay, are the only rivers that break through the coast chain of mountains, and between the Niger and the Congo there is no other known river that brings down so large a quantity of water as the Ogo bay.

OGYGES, a mythical king of Greece. During his reign occurred the deluge which is called after him the Ogygian. According to one tradition, he was the son of Boeotus, was king of the Heetenes, and the first ruler of Boeotia, which was named from him Ogygia. The oldest gate of Thebes was called the Ogygian gate. He is likewise described as king of Attica, and father of Eleusis and also of Dæira. By Strabo and Polybius he is spoken of as the last king of Achaia, and according to some legends he was an Egyptian monarch.

OHIO, one of the central states of the American Union, the fourth admitted under the constitution, lying between lat. 38° 27' and 41° 57' N., and lon. 80° 34' and 84° 49' W.; greatest length from E. to W. 225 m., greatest breadth from N. to S. about 200 m.; area, 39,964 sq. m. It is bounded N. by Michigan and Lake Erie, E. by Pennsylvania and West Virginia, S. by West Virginia and Kentucky, and W. by Indiana. The Ohio river extends along half of its E. and the whole of its S. boundary, having a course along the borders of the state of 436 m. The lake shore of Ohio has an extent of 230 m., giving the state a whole navigable water frontier of 666 m. Ohio is divided into 88 counties, viz.: Adams, Allen, Ashland, Ashtabula, Athens, Auglaize, Bel-

mont, Brown, Butler, Carroll, Champaign, Clarke, Clermont, Clinton, Columbiana, Coshocton, Crawford, Cuyahoga, Darke, Defiance, Delaware, Erie, Fairfield, Fayette, Franklin, Fulton, Gallia, Geauga, Green, Guernsey, Hamilton, Hancock, Hardin, Harrison, Henry, Highland, Hocking, Holmes, Huron, Jackson, Jefferson, Knox, Lake, Lawrence, Licking, Logan, Lorain, Lucas, Madison, Mahoning, Marion, Medina, Meigs, Mercer, Miami, Monroe, Montgomery, Morgan, Morrow, Muskingum, Noble, Ottawa, Paulding, Perry, Pickaway, Pike, Portage, Preble, Putnam, Richland, Ross, Sandusky, Scioto, Seneca, Shelby, Stark, Summit, Trumbull, Tuscarawas, Union, Van Wert, Vinton, Warren, Washington, Wayne, Williams, Wood, and Wyandot. Columbus, the capital (pop. in 1870, 31,274), is near the centre of the state; Cincinnati (pop. in 1870, 216,239) is the largest city. The other cities, with their population according to the census of 1870, are Akron, 10,006; Bellair, 4,033; Canton, 8,660; Chillicothe, 8,920; Circleville, 5,407; Cleveland, 92,829; Dayton, 30,473; Delaware, 5,641; Fremont, 5,455; Gallipolis, 3,711; Hamilton, 11,081; Ironton, 5,686; Lancaster, 4,725; Lima, 4,500; Mansfield, 8,029; Marietta, 5,218; Massillon, 5,185; Mount Vernon, 4,876; Newark, 6,698; Piqua, 5,967; Pomeroy, 5,824; Portsmouth, 10,592; Sandusky, 13,000; Springfield, 12,652; Steubenville, 8,107; Tiffin, 5,648; Toledo, 31,584; Urbana, 4,276; Warren, 3,457; Wooster, 5,419; Xenia, 6,377; Youngstown, 8,075; Zanesville, 10,011. The population of the state, and its rank in the Union according to the federal census, has been as follows:

YEAR.	White.	Colored.	Total.	Rank.
1800.....	45,028	337	45,365	18
1810.....	228,861	1,899	230,760	13
1820.....	578,572	4,728	583,300	5
1830.....	928,329	9,574	937,903	4
1840.....	1,502,122	17,345	1,519,467	3
1850.....	1,955,050	25,279	1,980,329	3
1860.....	2,302,808	36,673	2,339,511	3
1870.....	2,601,946	63,213	2,665,260	3

The total for 1860 includes 30 Indians, and that for 1870 30 Indians and 1 Chinaman. Of the total population in 1870, 1,337,550 were males and 1,327,710 females; 2,292,767 were of native and 372,493 of foreign birth. Of the natives, 1,842,313 were born in the state, 17,382 in Indiana, 26,230 in Kentucky, 23,292 in Maryland, 13,390 in Massachusetts, 13,239 in New Jersey, 67,594 in New York, 149,784 in Pennsylvania, and 62,936 in Virginia and West Virginia. Of the foreigners, 12,988 were born in British America, 36,561 in England, 82,674 in Ireland, 7,819 in Scotland, 12,939 in Wales, 182,897 in Germany, and 12,727 in Switzerland. The density of population was 66.69 persons to a square mile. There were 521,981 families with an average of 5.11 persons each, and 495,667 dwellings with an average of 5.38 to each. The increase of pop-

ulation from 1860 to 1870 was 13.92 per cent. There were 425,466 males and 420,505 females from 5 to 18 years of age, 501,750 males from 18 to 45, and 592,350 male citizens 21 years old and upward. The total number attending



State Seal of Ohio.

school was 645,639. There were 92,720 persons 10 years of age and over unable to read, and 173,172 unable to write. Of the latter, 134,102 were of native and 39,070 of foreign birth; 125,495 were 21 years old and over, including 41,439 white males and 68,449 white females, and 7,531 colored males and 8,076 colored females. During the year ending June 1, 1870, 6,383 paupers were supported at a cost of \$566,280; and 2,860 native and 814 foreign paupers were receiving support, June 1, 1870. In 1874 there were 6,001 paupers supported by the state. The number of persons convicted of crime during the year ending June 1, 1870, was 2,560; 1,405 were in prison at that date. The number convicted in 1874 was 2,682. Of the total population 10 years old and over (1,953,374), there were engaged in all occupations 840,889; in agriculture, 397,024, including 191,063 laborers and 202,425 farmers and planters; in professional and personal services, 168,308, of whom 3,572 were clergymen, 53,599 domestic servants, 68,518 laborers not specified, 2,563 lawyers, 4,638 physicians and surgeons, and 12,084 teachers not specified; in trade and transportation, 78,547; and in manufactures, mechanical and mining industries, 197,010. According to the census of 1870, the total number of deaths in that year was 29,568, or 1.11 per cent. of the population. Consumption was the cause of 17.8 per cent. of all deaths, and pneumonia of 6.8 per cent., the number of deaths being 5,255 from the former and 1,997 from the latter disease. During the year ending March 31, 1873, there were reported 26,460 marriages, 58,977 births, and 27,112 deaths. Of the deaths 24,890 were from ordinary causes, 1,531 from epidemic or uncommon diseases, and 691 from violence and accident.—Though the topography of Ohio is marked by

no striking features, its surface is pleasingly diversified. The general aspect is that of a plateau whose average elevation is 300 to 500 ft. above Lake Erie, which lies 565 ft. above the sea. The highest point in the state is in Logan co., 1,540 ft., and the lowest the shore of the Ohio near Cincinnati, 433 ft. above the sea. The numerous draining streams have deeply excavated and eroded this plateau, giving the surface an alternation of hills and valleys and a general rolling character. The most prominent feature in the topography is the great divide separating the drainage of Lake Erie from that of the Ohio. This passes diagonally across the state from Trumbull co. in the northeast to Mercer and Darke cos. in the west, with an average altitude of about 600 ft. above Lake Erie. From the summit of the watershed the surface slopes gradually northward to the lake and southward to the Ohio, and is more or less eroded by the draining streams. Many of these streams flow in valleys 200 to 300 ft. in depth, and the Ohio river occupies an excavated trough 500 to 600 ft. below the summits of the adjacent hills. The streams flowing southward to the Ohio are the longest and deepest, as the Mahoning, Muskingum, Hockhocking, Scioto, Little Miami, and Great Miami rivers. The Muskingum is made navigable by slackwater improvements to Dresden, a distance of 95 m. from its mouth. The shorter watershed on the N. side of the divide is drained by the Chagrin, Cuyahoga, Rocky, Black, Vermilion, Huron, Sandusky, Portage, and Maumee rivers, none of which are navigable for any distance from the lake. Bounded on its northern margin by Lake Erie, and on its southern by the navigable waters of the Ohio river, Ohio possesses water communication through the Erie canal and St. Lawrence river with the Atlantic ocean, and through the Mississippi with the gulf of Mexico. The outline of the lake shore, though but little interrupted, affords several harbors, as Ashtabula, Cleveland, Black river, Sandusky, and Toledo. The Ohio river, 130 ft. below Lake Erie at Cincinnati, and 100 ft. above at the crossing of the Ohio and Pennsylvania line, is navigable for light-draught vessels to Pittsburgh, excepting during dry seasons.—The soil of Ohio is universally fertile, though over more than one half of the state it is of foreign origin, being derived from the clays and gravels of the drift. The uplands are especially adapted to the growth of wheat, and for a long time Ohio was the largest grain-producing state. The southern slopes of the watershed are best fitted for the growth of grain, while the northern slopes are well suited for grazing and dairy lands; and the bottom lands of the larger rivers are among the richest corn-growing regions of the world. Though more wheat is produced in the S. W. part than in any other equal area in the state, it is more particularly the product of the Maumee region of the northwest and the Muskingum region of the southeast. The clay soils of the northeast,

or Western Reserve, form the great dairy region of the west, and furnish 19,000,000 of the 20,000,000 lbs. of cheese made annually in the state. The bottom lands of the larger rivers, as those of the Miami, the Scioto, and Muskingum, are rich alluvial soils, and as well adapted to the growth of Indian corn as any portion of the middle states. The rocks underlying the area drained by the Miami are calcareous, and the soil produced from them is of great fertility, being in fact an extension of the famous blue-grass region of Kentucky. Grape culture has received careful attention in the valley of the Ohio and on the shores and islands of Lake Erie, and large quantities of wine are annually produced there. Heavy crops of apples, peaches, and other fruits are also gathered, especially in the Miami region and on the shores of the lake. Originally almost the entire area of the state was covered by forests of oak, chestnut, maple, &c., on the highlands, and elm, beeches, ash, &c., on the lowlands, though in the northwest there are prairies of limited extent. The wild animals, as the deer, wolf, bear, raccoon, and fox, which once abounded in the state, have almost entirely disappeared.—The geological structure of Ohio exhibits no great breaks of the strata, and the sedimentary rocks which underlie the state show only a slight inclination from the horizontal. The chief disturbing element is the Cincinnati arch or anticlinal, which extends from the islands of Lake Erie to Cincinnati, and beyond into Kentucky and Tennessee. From this arch the strata dip westward to the Illinois coal field, and south-eastward under the Alleghany coal basin. A study of the composition of this anticlinal shows that its elevation must have occurred at the close of the lower Silurian and previous to the commencement of the upper Silurian age, thus establishing the fact that the Illinois and Alleghany coal fields were separate and distinct basins during the deposition of their strata. The geological formations exposed in the state are the lower Silurian, upper Silurian, Devonian, carboniferous, and drift. The oldest rocks are those of the lower Silurian age which are exposed at and near Cincinnati, called the Cincinnati group, the equivalents of the Trenton and Hudson formations of New York. These are composed of beds of limestone and clay or marl, and in the richness and variety of their fossil remains are unequalled by any other known locality. Their maximum thickness exposed near Cincinnati is about 1,000 ft. Of the formations of the upper Silurian age, the Clinton and Niagara limestones lie around and thin out upon the lower Silurian area, and are exposed at different points on the crown of the Cincinnati arch toward the lake. The Salina group, the formation containing the salt at Syracuse, N. Y., appears at Sandusky, 30 to 40 ft. in thickness, where it carries valuable beds of gypsum, but thins out toward the southwest and soon disappears. The waterlime, which represents the

Helderberg of New York, is very largely developed in the western part of the state and on the islands of Lake Erie. It flanks both sides of the Cincinnati arch, and its thickness near the lake is about 100 ft. The base of the Devonian system, the Oriskany, is recognizable in a few places as a saccharoidal sandstone, 3 to 10 ft. thick. The corniferous limestone, the chief element of the Devonian in Ohio, forms two belts of outcrop on opposite sides of the Cincinnati arch, one extending from Sandusky, where it is about 100 ft. thick, thinning out southward toward Columbus and disappearing in Pickaway co. The other belt crosses the N. W. corner of the state diagonally from Michigan near Toledo to the Indiana line near Van Wert. The surface rock of Kelley's island is also formed of corniferous limestone. It is largely quarried at Kelley's island, Sandusky, Columbus, and elsewhere for building stone and lime, and the state house at Columbus is built of it. The corniferous at Delaware and Sandusky also yields interesting fossil fish remains, such as *macropetalichthys* and *onychodus*. The Hamilton is exhibited in but few localities as a thin bed of marly limestone overlying the corniferous. The Huron or black shale, the equivalent of the Genesee and lower part of the Portage of New York, is a mass of black bituminous shale 300 ft. thick containing 10 to 20 per cent. of carbonaceous matter. It occupies the entire N. W. corner of the state and a belt 10 to 20 m. wide extending from the mouth of the Huron river on Lake Erie to the Ohio. It contains the remains of huge fossil fishes, *dinichthys*, and is the source of the oil and gas of Pennsylvania and parts of Ohio. The Erie shale, the upper member of the Devonian and the continuation of the Portage and Chemung of western New York, is a mass of argillaceous shale bordering the lake shore from the Pennsylvania line, where it is 1,000 ft. thick, to the Vermilion river, where it has thinned out and disappeared. Nearly the entire E. half of this state is underlaid by the members of the carboniferous system, which here form the N. W. border of the great Alleghany coal field. The base of this system is composed of the shales and sandstones of this Waverley group, which are the western continuation of the "vespertine" of Pennsylvania. The Berea grit, a sandstone stratum of the Waverley, is extensively quarried at Berea, Amherst, Independence, &c., in the N. part, and at Buena Vista in the S. part of the state, from which places it is largely exported for building purposes and grindstones. The S. E. third of the state is occupied by the coal measures, which are underlaid at places by the conglomerate, especially in the N. part, where it is locally 175 ft. thick; and also by the carboniferous limestone, which however is rarely over 20 ft. thick, and does not extend N. of the central part of the state. The coal measures are composed of strata of shale, sandstone, coal, limestone, and fire clay with iron

ores, with a maximum thickness of 1,200 ft. These cover in Ohio an area estimated at 10,000 sq. m. They are divided into the lower coal measures, 400 ft. thick, the barren measures, 400 ft., and the upper coal measures, 300 to 600 ft. In the lower coal measures there are seven workable seams of coal of general extent, varying in thickness from 2½ to 13 ft. The lowest and one of the most important seams is coal No. 1, the Brier Hill, Massillon, and Jackson coal. This is an open-burning block coal, 2 to 6 ft. thick, and is used extensively in the iron manufacture in the Mahoning and Tuscarawas valleys, and in Jackson co. Coal No. 6 is one of the most extended and valuable seams in the state. It is of variable thickness, and in the Hocking valley at Straitsville, &c., attains a maximum thickness of 12 to 13 ft. It is generally a coking coal, but as best developed in the Hocking valley is an excellent open-burning coal. The barren coal measures are so called because of the absence from them of any extended workable coals, though locally seams occur of value. The upper coal measures contain three to four workable seams, the lowest and most important of which is the Pittsburgh coal, or coal No. 8. It occupies the district extending from Steubenville to McConnellsville and Pomeroy. It is a strong caking coal, but inferior in quality to the same seam as developed in S. W. Pennsylvania. The deposits of the drift or quaternary cover about two thirds of the area of Ohio, and extend from the lake southward to a line irregularly drawn from the N. line of Columbiana co. on the east to Dayton and the Indiana line on the southwest. They consist of heavy beds of clay (the Erie clay), sand, gravel, and boulders, attaining sometimes a thickness of 200 ft., and giving character to the agriculture of large areas. The underlying rocks are often found planed, scored, and polished by glaciers. An interesting feature in the surface geology of Ohio is the buried river channels and deeply excavated troughs, now filled wholly or partially by sand, gravel, &c., many of which are occupied by rivers now flowing far above their old rocky bottoms. This points to a time at which the land was more elevated than at present, during which the river channels were excavated, and to a subsequent period during which the land was less elevated, and the channels were filled up; and it is considered that the area of the state has never been wholly submerged since the close of the carboniferous age.—The principal mineral products of Ohio are coal, iron, clays, gypsum, peat, salt, petroleum, lime, hydraulic cement, marl, and building stone. Coal is the great mineral staple of the state. The distribution and quality of the Ohio coals have been already noticed. The iron ores of the lower coal measures in the Hanging Rock region, in Lawrence, Jackson, and Scioto cos., are of great value, and sustain an iron manufacture of large extent. Blackband ore is

found in one or two localities in N. E. Ohio, associated with coals No. 1 and No. 4; but the most important deposit overlies coal No. 7, at the base of the barren measures, in Tuscarawas and Stark cos., where it attains a maximum thickness of 16 ft. It is there of considerable economic value, and is used in the manufacture of iron at Massillon, Dover, and Port Washington. The ores chiefly used in the extensive iron manufactures of Ohio, which ranks second among the iron-producing states, are obtained from the Lake Superior region, whence they are shipped to and distributed from Cleveland. Several varieties of fire clay underlie the coal seams, and at certain horizons clays are obtained which are valuable in the manufactures of pottery, fire brick, &c.; as those under coal No. 3 and coal No. 5, which are largely used on the upper Ohio and elsewhere in the E. part of the state. The products manufactured from these clays reach an annual value of over \$1,000,000. Some of the finest building stones found in the country are obtained from the sandstones of the Waverley group at Amherst and Berea in northern Ohio, and from Waverley and Buena Vista in the S. part of the state. From all these localities large quantities of free-stone, as well as flagging and grindstones, are exported to other states. The corniferous limestone has already been mentioned; and the sandstones of the coal measures also yield good building stone. Large quantities of white limestone have been taken from the great quarries in Montgomery and adjacent counties. Gypsum is mined from the Salina group at Sandusky, and is used both for architectural purposes and as a dressing for land. Salt is produced in many localities, as at Pomeroy in Meigs co., in Athens, Morgan, and Tuscarawas cos., derived mainly from the rocks of the Waverley group. Oil is obtained in small quantities from Mecca, Trumbull co., Grafton, Lorain co., and Liverpool, Medina co., from the Waverley; and more abundantly in southern Ohio on Duck creek, Noble co., from the coal measures, though its source is in the deeper strata of the Devonian. Lime of excellent quality is made from the Niagara and corniferous limestones in many localities in the western half of the state. Hydraulic cement is made in Belmont, Lucas, and Auglaize cos. At Barnesville in the former county 12,337 barrels were made in 1873, of a quality equal to any produced in this country.—The climate is pleasant and healthful. There are great and rapid changes in temperature, but the constantly varying winds prevent long continued extremes. In 1874 the mean temperature for the year was 49°76' at Cleveland, lat. 41° 30', and 55°24' at Cincinnati, lat. 39° 6'; the amount of rainfall was 38°43 inches at the former and 33°38 inches at the latter city.—Ohio holds a very high rank as an agricultural state. Its broad area of fertile valleys and undulating and table lands, its extensive hills, so favorable for raising sheep and other stock on a large

scale, its great shipping facilities on the northern and southern borders, and its network of railroads, afford unusual advantages for this industry. According to the federal census of 1870, Ohio ranked first among the states in the production of wool, flax, flax seed, and maple molasses; next to Illinois and New York in the extent of improved land in farms and in the total value of farm productions; to New York in the cash value of farms and the value of orchard and forest products; to Illinois in the amount of wheat produced and the value of animals slaughtered or sold for slaughter; to Pennsylvania in the production of clover seed; to Illinois and Iowa in Indian corn; to Vermont and New York in maple sugar; and to Indiana in sorghum molasses. According to returns made by the state authorities in 1874, Ohio ranked fifth among the states in the production of wheat and oats, third in Indian corn, and sixth in barley. In regard to the production of wheat, Ohio may be divided into three districts stretching across the state from E. to W. In 1873 the average yield per acre was 14·02 bushels in the northern, 12·61 in the central, and 10·36 in the southern district. More than a fifth of the entire wool clip of the country in 1870 was produced in Ohio, which contained more than a sixth of all the sheep in the United States. In 1874 there were more sheep reported in California than in Ohio, but their value was less. Of the 27,133,034 lbs. of flax produced in the United States in 1870, 17,880,624 lbs. were the product of Ohio. As a dairy state Ohio with New York and Pennsylvania is in the first rank. In 1870 each of the latter states contained more milch cows and produced more butter than Ohio; but in the amount of cheese produced and the quantity of milk sold Ohio ranked next to New York. The leading dairy counties are in the N. E. part of the state, known as the Western Reserve, the most important being Lorain, Trumbull, Ashtabula, Geauga, Portage, Medina, Cuyahoga, Summit, and Ashland. During the 14 years ending with 1873 the average annual production of butter was 37,613,639 lbs., and of cheese 23,981,990 lbs. According to the federal census of 1870, the state contained in farms 14,469,133 acres of improved land, 6,883,575 of woodland, and 359,712 of other unimproved land. The total number of farms was 195,953, containing an average of 111 acres each; 7,028 contained from 3 to 10 acres, 13,794 from 10 to 20, 55,286 from 20 to 50, 71,066 from 50 to 100, 48,072 from 100 to 500, 454 from 500 to 1,000, and 69 had over 1,000 acres. The cash value of farms was \$1,054,465,226; of farming implements and machinery \$25,692,787; total amount of wages paid during the year, including value of board, \$16,480,778; total estimated value of all farm productions, including betterments and additions to stock, \$198,256,907; orchard products, \$5,843,679; produce of market gardens, \$1,289,272; forest products,

\$2,719,140; home manufactures, \$1,871,409; animals slaughtered or sold for slaughter, \$40,-498,375; value of all live stock, \$120,300,528. In 1873 the assessors returned 18,575,239 acres of taxable lands, including 8,535,917 cultivated, 4,855,425 in pasture, 4,085,969 woodland,

and 541,022 other land unproductive. It was believed, however, that the actual amount was about 36 per cent. more than that reported. The chief crops, as returned by the federal census of 1870 and by the state authorities for the three following years, were as follows:

PRODUCTS.	1870.	1871.			1872.			1873.		
	Federal census.	Total production.	No. of acres sown.	Average production per acre.	Total production.	No. of acres sown.	Average production per acre.	Total production.	No. of acres sown.	Average production per acre.
Wheat, bush.....	27,882,159	22,274,878	1,667,659	13·27	18,087,664	1,611,217	11·22	21,974,885	1,742,756	12·61
Indian corn, bush.....	67,501,144	98,363,060	2,632,165	36·67	108,053,234	2,520,253	40·89	84,049,828	2,400,295	35·07
Rye, bush.....	846,890	423,014	87,907	11·50	295,549	25,166	11·75	291,829	27,927	10·45
Oats, bush.....	25,347,549	32,696,127	1,000,122	32·69	25,825,742	971,494	26·58	20,501,904	791,927	25·37
Barley, bush.....	1,715,221	1,941,240	81,252	23·89	1,528,266	72,483	21·08	1,074,906	49,872	21·55
Buckwheat, bush.....	180,341	177,988	14,972	11·88	266,507	84,882	7·65	213,074	21,002	10·14
Potatoes, Irish, bush.....	11,192,814	8,755,198	100,630	87	7,832,297	105,896	73·96	5,966,816	73,199	76·55
" sweet, bush.....	230,235	207,676	2,693	77	215,023	3,026	71	170,370	2,701	63·07
Hay, tons.....	2,289,565	1,928,221	1,881,975	1·05	1,733,350	1,815,558	1·02	1,870,212	1,966,315	1·05
Grass and clover seed, bush.....	151,166	384,974	.....	.....	308,903	.....	.....	205,944	.....	.....
Flax, lbs.....	17,880,624	24,477,361	85,568	.....	9,060,588	72,078	.....	5,070,788	43,650	.....
Flaxseed, bush.....	631,894	733,384	.....	.....	457,379	.....	.....	167,510	.....	.....
Tobacco, lbs.....	18,741,973	36,177,630	28,862	12·58	34,900,996	46,227	7·55	39,572,558	48,850	9·02

The counties having the greatest extent of cultivated land are Richland, Seneca, Wayne, Darke, Fairfield, and Montgomery, the total number

of acres under crops in these six counties being 999,925. Other agricultural productions have been reported as follows:

PRODUCTIONS.	1870. Federal census.	1871.	1872.	1873.
Wool, lbs.....	20,539,643	16,139,831	17,586,209	17,175,465
Hops, lbs.....	101,286	.....	.....	.....
Butter, lbs.....	50,266,872	44,994,152	45,413,066	43,533,865
Cheese, lbs.....	24,153,876	82,394,152	34,403,557	33,668,530
Milk, gallons sold.....	22,275,344	.....	.....	.....
Maple sugar, lbs.....	3,469,128	1,882,396	2,690,011	2,150,072
" molasses, galls.....	352,612	271,113	536,320	376,343
Sorghum sugar, lbs.....	.....	23,505	34,599	86,546
" molasses, galls.....	2,023,427	1,817,042	963,130	692,314
Honey, lbs.....	763,124	.....	.....	.....
Wax, lbs.....	22,488	.....	.....	.....
Orchards, acres.....	877,297	883,647	391,550	885,829
Apples, bush.....	11,012,582	10,437,437	21,632,475	11,343,431
Peaches, bush.....	809,639	860,530	405,619	94,516
Pears, bush.....	67,047	126,982	153,968	80,033
Vineyards, acres.....	10,890	11,219	15,111	19,660
Grapes, lbs.....	15,853,719	19,292,980	10,016,427	6,607,653
Wine, galls.....	2,577,907	1,081,923	425,923	208,289

The number of domestic animals reported by the federal census of 1870, and the number and value returned for taxation in 1874, were as follows:

ANIMALS.	1870.	1874.	
		Number.	Value.
Horses.....	704,664	729,303	\$45,932,368
Mules and asses.....	16,065	25,345	1,778,181
Cattle.....	.....	1,673,864	27,917,537
Milch cows.....	654,290	.....	.....
Working oxen.....	23,606	.....	.....
Other cattle.....	843,425	.....	.....
Sheep.....	4,928,635	4,338,868	10,452,067
Swine.....	1,728,968	1,915,220	6,152,875

—Ohio possesses great natural advantages as a manufacturing state, and holds a very high rank in this respect. According to the federal census of 1870, it ranked after New York, Pennsylvania, and Massachusetts in the amount of capital employed in manufactures and the value of products; first in the value of wooden ware;

next to Illinois in agricultural implements and distilled liquors; to New York in cooperage, linseed oil, and factory cheese; to Pennsylvania in iron ore and coal oil; to New York and Pennsylvania in iron castings, forged and rolled iron, sash, doors, and blinds, soap and candles, tin, copper, and sheet-iron ware, and malt; to Illinois and Missouri in bituminous coal and pork packed; and to California and Missouri in vinous liquors. It also ranked among the first in malt liquors, machinery, mining, and leather. The total number of manufacturing establishments of all kinds was 22,773, having 4,586 steam engines of 129,577 horse power, and 2,157 water wheels of 44,746 horse power, and employing 137,202 hands, of whom 119,686 were males above 16 years of age, 11,575 females above 15, and 5,941 youths. The capital employed amounted to \$141,923,964; wages, \$49,066,488; materials, \$157,131,697; products, \$269,713,610. The leading industries are represented in the following table:

INDUSTRIES.	No. of establish- ments.	Steam engines, horse power.	Water wheels, horse power.	Hands employed.	Capital.	Wages.	Value of materials.	Value of products.
Agricultural implements.....	219	8,581	288	5,124	\$7,570,320	\$2,841,518	\$5,240,550	\$11,907,366
Blacksmithing.....	2,406	45	....	4,270	1,089,692	518,222	988,602	8,099,476
Boots and shoes.....	2,358	48	....	6,738	2,058,067	1,747,310	2,834,261	6,559,946
Bread, crackers, and other bakery products.	279	250	....	975	495,522	284,582	1,288,604	2,202,818
Brick.....	331	516	8	2,409	638,660	462,758	294,420	1,252,887
Carpentering and building.....	1,618	300	....	4,924	1,086,777	1,481,134	8,277,849	6,805,653
Carriages and wagons.....	1,221	231	28	5,094	2,964,788	1,671,070	1,587,164	5,049,580
Cars, freight and passenger.....	11	467	....	1,462	1,855,970	917,565	1,865,679	2,555,855
Cheese.....	195	817	40	759	474,970	116,635	1,875,711	2,287,804
Clothing, men's.....	773	....	....	10,632	4,696,727	2,436,829	7,496,501	12,867,440
Coal oil, rectified.....	25	885	....	270	757,000	157,859	4,496,168	5,988,473
Cooperage.....	658	963	50	8,206	1,108,957	1,105,530	1,729,417	3,554,171
Flouring and grist-mill products.....	1,396	18,884	26,564	3,982	11,834,952	965,724	26,498,777	81,692,210
Furniture, not specified.....	558	2,299	193	4,996	5,004,465	2,106,971	1,734,459	5,794,376
" chairs.....	55	575	48	1,275	610,600	382,071	419,106	998,209
Hubs and wagon materials.....	58	1,698	145	1,801	1,803,450	548,647	665,190	1,712,208
Iron, rolled and forged.....	38	11,186	100	4,670	6,686,659	2,791,560	8,485,585	18,083,169
" nails and spikes, cut and wrought.....	10	1,477	....	870	841,241	198,140	1,807,402	2,097,848
" pigs.....	65	10,158	....	4,582	7,487,826	2,085,520	7,056,405	10,956,938
" castings, not specified.....	215	2,858	453	8,073	5,656,879	1,757,800	8,569,086	7,318,102
" stoves, heaters, and hol. ware.	53	968	32	1,987	2,616,750	1,100,586	1,195,424	3,221,298
Leather, tanned.....	495	1,622	94	1,265	2,171,108	379,178	2,768,493	8,714,232
" curried.....	387	210	....	796	1,057,788	251,418	2,933,218	3,522,100
Liquors, distilled.....	63	2,710	205	735	2,529,700	869,987	4,371,289	7,022,656
" malt.....	199	1,257	4	1,805	5,397,272	748,540	2,711,270	5,759,666
" vinous.....	88	....	....	124	369,900	25,800	179,775	809,375
Lumber, planed.....	142	2,883	95	1,095	1,212,902	491,263	1,599,615	2,519,745
" sawed.....	2,228	36,693	9,600	8,225	6,188,179	1,534,759	4,913,328	10,102,780
Machinery, not specified.....	142	1,750	528	2,254	3,895,885	1,244,973	1,880,596	4,198,912
" railroad repairing.....	13	732	....	1,562	2,447,284	1,117,110	1,130,389	2,248,149
" steam engines and boilers.....	72	1,265	20	2,311	2,826,120	1,801,649	2,656,409	4,801,341
Malt.....	34	189	80	166	965,228	75,301	943,813	1,129,695
Marble and stone, work not specified.....	79	1,010	70	927	1,086,125	410,396	489,674	1,112,072
" monuments and tomb- stones.....	118	172	....	677	661,445	278,590	502,865	1,108,951
Meat, packed, pork.....	58	106	....	880	8,792,490	341,964	9,870,626	10,655,950
Oil, animal.....	11	108	....	148	501,000	71,822	1,553,156	1,702,943
" linseed.....	23	866	277	202	1,090,967	76,590	1,537,290	1,840,000
Paper, printing.....	17	1,288	519	785	1,604,800	306,273	1,511,145	2,199,880
" wrapping.....	20	863	965	868	876,000	144,776	792,664	1,224,253
Patent medicines and compounds.....	17	16	....	134	417,400	63,750	269,442	1,004,200
Printing and publishing, not specified.....	43	425	....	1,433	1,768,400	945,521	953,444	2,596,720
Saddlery and harness.....	787	....	....	1,999	832,328	419,097	992,922	2,074,265
Salt.....	40	849	40	437	1,085,904	161,420	362,922	773,492
Sash, doors, and blinds.....	142	8,428	250	2,078	2,428,528	949,374	1,730,236	8,416,998
Soap and candles.....	42	267	....	407	1,035,150	166,518	2,337,625	2,976,554
Stone and earthen ware.....	170	482	19	1,244	751,700	417,508	250,070	970,749
Tin, copper, and sheet-iron ware.....	652	77	....	2,313	1,598,483	711,421	1,458,534	8,214,285
Tobacco, chewing, smoking, and snuffing.....	35	206	19	1,042	570,980	269,700	1,498,626	2,880,583
" cigars.....	406	6	....	2,499	826,369	769,987	973,174	2,666,183
Woolen goods.....	191	2,689	1,573	2,169	2,962,169	554,630	1,895,622	3,187,815

Besides the above, there were 535 establishments engaged in mining, having 121 steam engines of 4,143 horse power, and employing 11,241 hands, about one half of whom are employed under ground. The capital invested amounted to \$9,017,197, and the annual products to \$7,751,544. Among the latter were 2,527,285 tons of bituminous coal, valued at \$5,482,952; 316,529 of iron ore, \$960,984; petroleum, \$228,488; and stone, \$1,079,120. According to returns by the state authorities, 55,316,666 bushels of coal were mined in 1871, 110,438,754 in 1872, and 87,794,240 in 1873. The counties in which the largest amounts were produced in the last named year were Stark, 10,002,642 bushels; Perry, 9,979,056; Trumbull, 8,217,248; Athens, 7,803,637; Columbiana, 6,728,570; Meigs, 5,757,203; Summit, 5,395,444; and Wayne, 5,189,018. There were 336,758 tons of iron ore mined in 1872, and 332,972 in 1873, more than half being the product of Lawrence and Jackson cos. The production of pig iron was reported by the American iron and steel association at 399,743

tons in 1872, and 406,029 in 1873, which was about one seventh of the entire product of the United States. The number of stacks in 1873 was 988. In 1873 the assessors reported 44 rolling mills, including 15 manufacturing rails, 4 Bessemer steel rails, and 7 other kinds of steel. The reported production of salt was 4,154,187 bushels; petroleum, 1,315,660 gallons; lime, 488,331 barrels; water cement, 12,377 barrels; stone ware, 4,525,300 gallons. In extent of pork packing Ohio ranks above all other states except Illinois. During the winter season of 1874-'5 there were packed 871,736 hogs, weighing in the aggregate 241,737,547 lbs., the average gross weight being 277.3 lbs. each. The total product of lard was 35,459,594 lbs.; value of hogs packed, \$16,597,490. Among the other products were 465,075,171 lbs. of green sides, 186,030,068 of shoulders, and 162,776,309 of hams. The chief seat of this industry is Cincinnati, where the number of hogs packed was 560,164. (See CINCINNATI.)—Ohio has three United States customs districts, Miami, Sandusky, and Cuyahoga, the

ports of entry being Toledo, Sandusky, and Cleveland. Cincinnati is a port of delivery in the district of Louisiana. By act of congress of July, 1870, it is also made a port of entry, where merchandise may be entered without appraisement at the port of first arrival. The value of the merchandise thus transported during the year ending June 30, 1874, was \$111,576; that entered from other districts amounted to \$75,435. The imports and domestic exports in the three customs districts during the year ending June 30, 1874, were as follows:

DISTRICTS.	Imports.	Domestic exports.
Cuyahoga.....	\$449,118	\$1,426,990
Miami.....	79,018	1,836,825
Sandusky.....	26,240	264,914
Total.....	\$554,376	\$3,528,729

The number of vessels and tonnage that entered and cleared in the foreign trade, and the whole number registered, enrolled, and licensed in each district, were as follows:

DISTRICTS.	ENTERED.		CLEARED.		REGISTER'D, &C.	
	No.	Tons.	No.	Tons.	No.	Tons.
Cuyahoga...	924	198,676	947	189,587	10	2,320-20
Miami.....	302	69,517	286	71,339	..	.....
Sandusky ..	186	12,089	155	14,832	..	.....
Total.....	1,362	280,282	1,388	275,258	10	2,320-20

The number of vessels engaged in the coastwise trade and those built in the different districts were as follows:

DISTRICTS.	COASTWISE TRADE.				BUILT.	
	ENTERED.		CLEARED.			
	No.	Tons.	No.	Tons.	No.	Tons.
Cuyahoga...	3,315	1,126,839	3,418	1,170,351	20	11,242-75
Miami.....	1,962	441,598	1,918	425,951	6	1,807-84
Sandusky.....	3,140	479,897	3,124	474,602	2	614-16
Total.....	8,417	2,048,329	8,460	2,070,904	28	13,664-75

—The mileage of railroads in Ohio has increased from 36 m. in 1841 to 572 in 1851, 3,024 in 1861, 3,176 in 1865, 3,214 in 1867, 3,224 in 1869, 3,457 in 1871, 3,787 in 1872, and 4,163 in 1873; and 4,374 m. of main line and branches were reported by the commissioners of railroads and telegraphs, June 30, 1874, besides which there were 1,142 m. of sidings and other tracks, making the total extent of track 5,516 m. The total amount of capital stock paid in was \$147,902,160; funded and other debt, \$151,029,300; total stock and debt, \$298,931,461; number of passengers carried, 14,886,294; freight, 26,199,435 tons; gross earnings on 4,195 m. operated, \$37,177,129; net earnings, \$10,182,894. The lines in operation in 1874, with their termini and number of miles completed, are represented in the following table:

NAME OF CORPORATION.	TERMINI.		Miles in operation in the state in 1874.	Total length between termini when different from the preceding.
	From	To		
*Ashtabula, Youngstown, and Pittsburgh.....	Youngstown.....	Ashtabula.....	63	....
Atlantic and Great Western.....	Salamanca, N. Y.....	Dayton.....	248	387
Extension { By means of extra rail on Cincinnati,	Dayton.....	Cincinnati.....	60	....
Hamilton, and Dayton road.....	Cleveland.....	Sharon, Pa.....	80	81
Divisions { Cleveland and Mahoning.....	Niles.....	New Lisbon.....	33	....
Niles and New Lisbon.....	Girard.....	New Vienna.....	8	....
Liberty and Vienna.....	.....	.....	.....	.....
Baltimore and Ohio.....	Centreton.....	Chicago, Ill.....	95	269
Leased { Central Ohio.....	Columbus.....	Bellaire.....	137	....
Sandusky, Mansfield, and Newark.....	Sandusky.....	Newark.....	116	....
Newark, Somerset, and Straitsville.....	Newark.....	Shawnee.....	44	....
Chicago and Canada Southern (branch).....	Toledo.....	Trenton Crossing, Mich.....	4	38
†Cincinnati and Indiana.....	Cincinnati.....	Indiana state line.....	20	....
Cincinnati, Hamilton, and Dayton.....	Dayton.....	Cincinnati.....	60	....
Leased { Cincinnati, Hamilton, and Indianapolis.....	Hamilton.....	Indianapolis, Ind.....	21	98
Cincinnati, Richmond, and Chicago.....	Cincinnati.....	Richmond, Ind.....	37	42
Dayton and Michigan.....	Dayton.....	Toledo.....	141	....
*Cincinnati and Muskingum Valley.....	Dresden Junction.....	Morrow.....	148	....
Cincinnati, Sandusky, and Cleveland.....	Springfield.....	Sandusky.....	130	....
Branch.....	Carey.....	Findlay.....	15	....
Leased, Columbus, Springfield, and Cincinnati.....	Springfield.....	Columbus.....	45	....
Cleveland, Columbus, Cincinnati, and Indianapolis.....	Cleveland.....	Columbus.....	138	....
Leased, Cincinnati and Springfield.....	Galion.....	Indianapolis, Ind.....	119	208
Cleveland, Mt. Vernon, and Delaware.....	Delaware.....	Springfield.....	50	....
Leased, Massillon and Cleveland.....	Springfield.....	Cincinnati.....	74	....
*Cleveland and Pittsburgh.....	Hudson.....	Columbus.....	145	....
River division.....	Clinton.....	Massillon.....	13	....
Tuscarawas branch.....	Cleveland.....	Rochester, Pa.....	109	124
Columbus and Hocking Valley.....	Bellaire.....	Yellow Creek.....	43	....
Branch.....	Bayard.....	New Philadelphia.....	32	....
Dayton and Union.....	Columbus.....	Athens.....	76	....
†Harrison branch.....	Logan.....	New Straitsville.....	13	....
	Dodson.....	Union City, Ind.....	32	....
	Valley Junction.....	Harrison.....	7	....

* Operated by the Pennsylvania railroad company.

† Operated by the Indianapolis, Cincinnati, and Lafayette railroad company.

‡ Operated by the Whitewater Valley railroad company of Indiana.

NAME OF CORPORATION.	TERMINI.		Miles in operation in the state in 1874.	Total length between termini when different from the preceding.
	From	To		
Iron.....	Ironton.....	Centre Station.....	14	.....
Lake Erie and Louisville.....	Sandusky.....	Cambridge City, Ind..	87	189
Lake Shore and Michigan Southern	Buffalo, N. Y.....	Chicago, Ill.....	265	539
Sandusky branch.....	Elyria.....	Milbury.....	77	.....
Franklin division.....	Ashtabula.....	Oil City, Pa.....	86	87
Leased, Mahoning Valley.....	Andover.....	Youngstown.....	88	.....
Lake Shore and Tuscarawas Valley.....	Black River.....	Uhrichsville.....	100	.....
*Mansfield, Coldwater, and Lake Michigan.	Mansfield.....	Allegan, Mich.....	64	223
§Marietta and Cincinnati.....	Parkersburg, W. Va.....	Cincinnati.....	201	.....
Branches.....	Marietta.....	Scott's Landing.....	4	.....
	Portsmouth.....	Hamden.....	56	.....
	Hillsboro.....	Blanchester.....	21	.....
Marietta, Pittsburgh, and Cleveland.....	Marietta.....	Canal Dover.....	98	.....
Ohio and Mississippi.....	Cincinnati.....	St. Louis, Mo.....	19	340
Ohio and Toledo.....	.....	.....	10	.....
Painesville and Youngstown.....	Painesville.....	Youngstown.....	50	64
*Pittsburgh, Cincinnati, and St. Louis.....	Pittsburgh, Pa.....	Columbus.....	125	193
Branch.....	Junction.....	Cadiz.....	8	.....
Columbus, Chicago, and Indiana Cen-	Columbus.....	Chicago, Ill.....	105	314
tral.....	Bradford Junction.....	Indianapolis, Ind.....	32	106
Leased Little Miami.....	Columbus.....	Cincinnati.....	120	.....
Branches.....	Xenia.....	Springfield.....	19	.....
Dayton and Xenia.....	Dayton.....	Xenia.....	16	.....
Dayton and Western.....	Dayton.....	Richmond, Ind.....	41	.....
*Pittsburgh, Fort Wayne, and Chicago.....	Pittsburgh, Pa.....	Chicago, Ill.....	249	468
Branch.....	Lawrence Junction, Pa.....	Youngstown.....	17	.....
Rocky River.....	Cleveland.....	Rocky River.....	5	.....
Toledo, Canada Southern, and Detroit.....	Toledo.....	Detroit, Mich.....	7	57
*Toledo, Tiffin, and Eastern.....	Tiffin.....	Toledo.....	42	.....
Toledo, Wabash, and Western.....	Toledo.....	Camp Point, Ill.....	76	454

Ohio has 654 m. of canals proper, 36 m. of feeders and side cuts, 11 m. of reservoirs, and 95 m. of the Muskingum slack-water improvement, from Marietta to Dresden, making a total of 796 m. of artificial navigation. The first canal (the Ohio) was begun in 1825, and the last completed in 1844. The total cost of all was \$14,688,666. The canals are as follows:

Ohio, Cleveland to Portsmouth.....	369 m.
Trenton feeder.....	3
Dresden side cut.....	2
Granville feeder.....	6
Columbus feeder.....	11
Miami and Erie, Cincinnati to Toledo.....	246
Branch to Indiana state line, connecting with Wabash and Erie canal.....	18
Sidney feeder.....	14
St. Mary's reservoir.....	11
Walhonding, Roscoe to Rochester.....	25
Hocking, Carroll to Athens.....	56

—The number of national banks in the state Nov. 1, 1874, was 170, having a paid-in capital of \$29,223,000; bonds on deposit, \$25,964,750; circulation issued, \$34,474,265; outstanding, \$23,605,633. The circulation was \$8 68 per capita, 1 per cent. of the wealth of the state, and 80·8 per cent. of the bank capital. Besides the above, 21 state banks were reported in 1874, capital \$658,666; 32 savings banks, capital \$1,879,324; and 190 private banks, capital \$8,502,414.—The present constitution of Ohio was adopted in 1851. The right to vote is secured to every white male citizen of the United States 21 years of age, who has resided one year in the state, 30 days in the county, and 20 in the township, village, or ward, next preceding the election. Colored citizens are entitled to vote under the federal constitution. The general

elections are held annually on the second Tuesday of October. The general assembly consists of a senate of 36 members and a house of 105 representatives, both elected for two years. Its regular sessions are biennial, beginning on the first Monday of January in even years. The executive officers are a governor, salary, \$4,000; lieutenant governor, \$800; secretary of state, \$2,000; auditor, \$3,000; treasurer, \$3,000; comptroller of the treasury, \$2,000; attorney general, \$1,500 and fees; and commissioner of schools, \$2,000. All are chosen for two years, except the auditor, whose term is four, and the comptroller and commissioner of schools, who hold office for three years. The board of public works comprises three members, who are also elected. The commissioner of railroads and telegraphs, the superintendent of insurance, supervisor of public printing, gas commissioner, and state and law librarians are appointed by the governor. The state board of agriculture consists of ten members, five of whom are chosen annually for two years, at a convention composed of the presidents of the county agricultural societies. The officers are chosen annually by the board. The supreme court consists of a chief justice and four judges, salary \$3,000 each. It has original jurisdiction in quo warranto, mandamus, habeas corpus, and procedendo, and appellate jurisdiction of the judgments of the district courts. Regular terms are held annually in Columbus, beginning on the first Monday in December. The state is divided into nine common pleas districts, each of which is subdivided into three parts, each part electing one or more of the judges. Courts

§ Including the Cincinnati and Baltimore railroad, which extends from Cincinnati 6 m. eastward.

of common pleas are held by one or more of the judges in each county, and district courts by the common pleas judges of each district, with one judge of the supreme court. The district courts have original jurisdiction similar to that of the supreme court, and appellate jurisdiction of the judgments of the common pleas. They are composed of the judges of the common pleas in the respective districts and one of the judges of the supreme court. A court of common pleas is held in each county by a single judge, and has original jurisdiction when the amount in controversy exceeds \$100, and appellate jurisdiction from justices of the peace and probate courts. There are special superior courts in Cincinnati, Cleveland, Dayton, and Xenia. Probate courts are established in each county. Justices' courts have exclusive jurisdiction in civil actions where the amount does not exceed \$100, and concurrent jurisdiction with the common pleas when the amount is between \$100 and \$300. All judges are elected, those of the supreme and common pleas courts for five years. The state is divided into two United States judicial districts, the courts being held in Cincinnati, Cleveland, and Toledo. A married woman may hold, free from the interference of her husband or his creditors, the property belonging to her at the time of marriage, or afterward acquired by gift, bequest, or inheritance, or by purchase with her separate means, and may dispose of such property by will. She has similar control of her earnings. Divorces may be obtained for three years' desertion, adultery, impotence, extreme cruelty, fraudulent contract, gross neglect of duty, habitual drunkenness for three years, or imprisonment under criminal sentence. Wills, except nuncupative, must be in writing and signed by two or more witnesses. The legal rate of interest is 6 per cent.; not more than 8 per cent. may be agreed upon in writing, but 6 per cent. may be recovered on a contract for more than 8 per cent. Statistics of agriculture, industry, &c., are annually collected by township assessors and published under the direction of the secretary of state. Ohio has 2 senators and 21 representatives in congress, and has therefore 23 votes in the electoral college.—The state funds, not including transfers, during the year ending Nov. 15, 1874, were:

FUNDS.	Receipts.	Disbursements.	Balance, Nov. 15, 1874.
General revenue.....	\$1,024,583	\$725,864	\$198,876
Asylum.....	1,875,889	1,943,395	40,224
Sinking.....	1,313,216	910,121	450,570
State common school..	1,535,125	1,487,562	127,127
National road.....	17,971	19,093	.....
Total.....	\$5,768,789	\$5,085,978	\$812,397

The receipts of the general revenue fund included \$929,672 from taxes and licenses, \$19,271 insurance fees, \$24,930 from board of public works, and \$42,440 from sale of Central Ohio lunatic asylum grounds. Among the dis-

bursements were \$150,278 for salaries of the judiciary, \$135,909 for state binding, printing, and stationery, \$127,543 expenses of constitutional convention, \$101,159 for legislature, \$44,275 for public works, \$37,876 for clerks in civil departments, \$31,587 for salaries of state officers, \$16,976 for geological survey, and \$3,000 for encouragement of agriculture. The funded debt of the state on Nov. 15, 1874, amounted to \$7,988,205, of which \$22,365 had ceased to draw interest and \$7,965,840 was interest-bearing. The local debts on Sept. 1, 1874, were \$21,886,007, making the entire indebtedness of the state (with an irreducible debt of \$4,121,394) \$33,995,606. The total amount of taxable property in 1874 was returned at \$1,580,379,324, including \$1,052,257,736 real estate, of which \$354,849,199 was in cities, towns, and villages, and personal property valued at \$528,121,588. The total taxes levied on this valuation amounted to \$26,837,196 (exclusive of \$777,532 for delinquent taxes and forfeitures of other years), including \$5,050,367 for state and \$6,038,750 for county purposes, and \$15,748,079 township, city, school and special taxes. The purposes for which the state tax was levied, with the amounts and rates, were as follows:

FUNDS.	Rate. Mills on the dollar.	Amount.
General reserve.....	·5	\$788,856
Asylum.....	·9	1,419,941
Sinking.....	·8	1,262,170
State common school.....	1·0	1,579,400
Total.....	3·2	\$5,050,367

The value of taxable property and the amount of taxes levied for a series of years have been as follows:

YEARS.	Value of realty.	Value of personalty.	Total value of taxable property.	State tax.	Total taxes on duplicate.
1840	\$85,287,261	\$27,098,895	\$112,326,156	\$564,435	\$1,755,539
1850	341,388,838	98,487,502	499,876,340	1,413,890	4,227,708
1860	639,894,311	248,408,290	888,302,601	3,503,713	10,817,076
1861	643,585,552	248,966,532	892,850,084	4,056,879	11,656,514
1862	645,670,080	248,615,312	889,285,292	4,129,473	10,185,285
1863	649,500,022	256,871,222	986,871,244	4,722,608	11,539,574
1864	655,498,100	351,193,016	1,006,696,116	5,329,963	16,595,639
1865	660,557,979	409,047,576	1,069,605,555	5,663,867	20,870,528
1866	663,647,542	442,561,379	1,106,208,921	8,867,167	18,868,431
1867	673,998,757	464,761,022	1,138,754,779	9,381,099	20,258,615
1868	683,452,487	460,008,899	1,143,461,386	9,997,472	20,459,148
1869	697,418,208	459,762,292	1,157,180,455	4,045,476	22,282,577
1870	707,846,836	459,884,561	1,168,731,697	4,666,242	23,463,631
1871	1,025,619,034	476,510,937	1,502,129,971	4,350,728	22,955,383
1872	1,030,160,528	494,159,590	1,524,323,118	4,414,557	23,248,979
1873	1,041,763,391	525,510,708	1,567,274,099	5,477,859	26,131,353
1874	1,052,257,736	528,121,588	1,580,879,324	5,050,367	26,837,196

—Ohio has made liberal provision for the care of its defective and dependent classes. Four institutions for the insane are wholly and two partially supported by the state. The oldest is the central Ohio hospital, which was opened at Columbus in 1839. The building was destroyed by fire in 1868, and a new one is now

(1875) in process of construction on a plot of 300 acres of land near the same city. For 15 years prior to its destruction the average daily number of inmates of this institution was 262. The other state hospitals for the insane are the northern Ohio, in Newburgh, Cuyahoga co.; the southern Ohio, in Dayton, and the south eastern, in Athens. The Longview lunatic asylum, near Cincinnati, belongs to Hamilton co., but state patients are received here, and the institution is supported in part by legislative appropriations, which in 1874 amounted to \$81,856. Both white and colored insane persons are treated in this institution. The Lucas county asylum, known also as the Northwestern hospital for the insane, near Toledo, does not belong to the state, but receives state patients. During the year ending March 31, 1874, 1,018 were sent to the hospitals for the insane. There is also a city institution for the insane in Carthage, opened in 1860. The state asylum for idiots in Columbus has been in existence since 1857. The present building was first occupied in 1868. (See IDIOCY, vol. ix., p. 174.) The asylum for the deaf and dumb and that for the blind are in Columbus. The former had 24 instructors in 1874, and the latter 14. The soldiers' and sailors' orphans' home was established near Xenia, Greene co., in December, 1869, and was sustained by private contributions till May 1, 1870, when it became a state institution. The state reform school is situated upon a farm of 1,170 acres 6 m. S. of Lancaster. The buildings, 15 in number besides barns and outhouses, with the yards, lawns, and play grounds, occupy 20 acres. Boys are sent to the institution by some court of record for

crime or misdemeanor, and are here classed in families of 50, each family being under the supervision of an "elder brother," an assistant elder brother, and a female teacher. Besides receiving instruction, the boys are employed in farm work and other industrial pursuits. Since the opening of the institution in 1857, 1,984 boys have been admitted and 1,520 discharged, the average time of detention being 2½ years. The industrial school for girls is at White Sulphur Springs, where the state owns 189 acres of land. The state penitentiary is in Columbus. The convicts are employed in various manufactures on the direct account of the state, and their labor is let out to contractors. By good behavior and diligence in his work, a convict may diminish his sentence five days a month, and receive a portion of his earnings, not exceeding one tenth. If he passes the entire period of his sentence without violating the rules of the prison, he will be restored to citizenship. There is a separate department for insane convicts. The total receipts during the year ending Nov. 1, 1874, were \$177,367, including \$165,207 from convict labor; the expenditures were \$171,955, not including \$4,362 expended in the manufacture of gas for public institutions. During the year 509 prisoners were received, 371 were discharged, and there were 1,005 in confinement at the close of the year. The total disbursements by the state on account of the penitentiary amounted to \$187,103, besides \$61,576 for the prosecution and transportation of criminals. The condition of the charitable and reformatory institutions for the year ending Nov. 15, 1874, is given in the following statement :

INSTITUTIONS.	Opened.	INMATES.		Current expenses and ordinary repairs.	Total disbursements by the state.
		Whole No.	Average daily No.		
Central Ohio hospital for the insane.....	1839	.....	.....	.....	\$304,523
Northern " " " ".....	1855	527	253	\$57,741	355,841
Southern " " " ".....	1855	960	526	99,396	99,396
Southeastern Ohio hospital for the insane.....	1874	708	426	94,725	220,539
Longview asylum for the insane.....	1861	755	582	119,424	210,369
Lucas co. " " " ".....	1871	174	100	25,028	25,278
Asylum for idiots.....	1857	856	352	69,903	97,012
" for deaf and dumb.....	1829	468	400	81,781	81,781
" for blind.....	1837	169	109	40,763	121,067
Soldiers' and sailors' orphans' home.....	1869	555	520	61,051	88,567
Reform school.....	1857	636	450	49,901	63,563
Girls' industrial home.....	1869	166	143	20,202	49,728

In April, 1874, there were reported in the state, not in any of the above named institutions, 1,347 insane, 1,271 idiotic, 1,039 deaf and dumb, and 870 blind. During the year ending March 31, 1874, 4,066 paupers were supported in county infirmaries, besides 1,935 dependent persons otherwise maintained by counties.—The first law assessing a school tax in Ohio was passed in 1825. In 1838 the school laws were revised, and a state common school fund of \$200,000 was established, to be distributed among the several counties according to the number of youth therein. The office of state superintendent of common schools was

established in 1837 and abolished in 1840. In 1853 the office of state commissioner of common schools was created. In 1873 the school acts were consolidated into a general law, which provides for the division of the state into school districts of five classes. City districts of the first class include cities having by the census of 1870 a population of 10,000 or more, while cities having less than 10,000 inhabitants constitute city districts of the second class. Village districts embrace incorporated villages. The territory not within any of these classes is divided into special districts and township districts. In all of these districts boards of

education are elected by the people. Among other duties they may authorize and require for school purposes a tax not exceeding seven mills on the dollar. They may require any language to be taught in the schools under their control, and are required to provide instruction in the German language upon the demand of 75 freeholders, representing not less than 40 pupils who desire and intend to study both the German and English languages. Prior to 1873 instruction in the German language exclusively was given in many of the public schools. Under the new law all branches must be taught in the English language. Boards of education are also empowered to establish separate schools for colored children when their number exceeds 20, and to provide suitable evening schools for whites. An enumeration of all unmarried persons between 6 and 21 years of age is required to be made in each district annually. The state commissioner of common schools is chosen by the people for three years, and receives a salary of \$2,000 besides his travelling and contingent expenses. He is required to visit annually each judicial district, and to make a report before Jan. 20. A state board of three examiners, appointed by the state commissioner for two years, are authorized to issue life certificates to teachers upon examination; there are also county examiners. The state common school fund consists of the proceeds arising from the sale of lands appropriated by congress for the support of schools and the amount accruing from the one-mill tax on the taxable property of the state. The school statistics for 1873-'4, as reported by the state commissioner of common schools, are as follows:

Number of persons between 6 and 21 years of age..	955,947
White	968,548
Colored.....	22,399
Males.....	505,001
Females.....	480,946
Number of school districts.....	1,919
" of school houses.....	11,638
" of school rooms.....	14,768
Estimated value of school houses and grounds.....	\$18,829,586
Number of teachers (males 9,911, females 12,464).....	22,375
Average number of weeks the schools were in session.....	29
" " of pupils enrolled.....	707,943
" " in daily attendance.....	429,630
Number of teachers in colored schools.....	160
Pupils.....	6,131
Total revenue for school purposes.....	\$8,300,594
Income from mill tax.....	\$1,491,510
" from interest on irreducible funds and rents of school lands.....	\$225,523
Income from local taxes (average rate 5-28).....	\$5,960,625
" from sale of bonds.....	\$399,625
" from fines, licenses, &c.....	\$228,310
Total expenditure.....	\$8,072,167
Amount paid teachers.....	\$4,614,499
" for supervision.....	\$188,530
" for sites and buildings.....	\$1,474,082
" for interest on and redemption of bonds.....	\$516,608
Amount paid for fuel and contingent expenses.....	\$1,328,452
Average cost per pupil on year's expenditures, net per capita on average daily attendance.....	\$14 15
On enrollment.....	\$8 57
Average cost per pupil enrolled including 6 per cent. on value of permanent improvements.....	\$9 55

The number of high schools reported was 108, having 678 teachers and 23,372 pupils. Be-

sides the public schools above enumerated, there were in the state 265 instructors and 13,066 pupils in private schools. These schools receive no support from the public school funds, but boards of education are required to report concerning their condition. Ohio has no state normal school; but several institutions not receiving public funds are maintained for the training of teachers. Chief among these are the National normal school in Lebanon, the Northwestern Ohio in Ada, the Northwestern in Fostoria, the Ohio Central in Worthington, the Western Reserve in Milan, the McNeeley in Hopedale, the Orwell normal institute in Orwell, and the normal school in Cincinnati. Most of these have courses of instruction in addition to the normal. The most extensive of them is the National normal school, opened in 1856, which has collegiate (including scientific and classical courses), teachers', engineering, business, and preparatory departments, in all of which there were in 1873-'4 17 teachers, of whom 7 were females, and 1,657 pupils, of whom 324 were females. During 1873-'4, 75 teachers' institutes were held, and were attended by 8,579 teachers. Nothing is contributed by the state to the support of this means of training teachers. Of the cost (\$15,318) of maintaining these institutes, \$11,792 was taken from the fund accruing from the fee of 50 cents paid by each applicant for a teacher's certificate, and \$3,332 was contributed by teachers and others. The Ohio agricultural and mechanical college has been established by means of the congressional land grant of 1862, from which a productive fund of over \$500,000 has been realized. The institution was opened in Columbus in September, 1873. The system of instruction embraces three schools: 1, exact sciences, including mathematics, civil engineering, physics and mechanics, and chemistry; 2, natural history, comprising botany, zoology, geology, and agriculture; 3, letters, embracing the English, German, French, Latin, and Greek languages and literatures. Social science and political economy are also taught. The entire course of instruction occupies four years. The studies of the first two years are prescribed. During the remainder of the course the student has a liberty of choice from six courses of study. He is required to take at least one from each of the schools above mentioned, and may take all of his remaining studies from one school. Instruction is free to pupils of both sexes. Applicants for admission are examined in the ordinary English branches. The degrees of bachelor of arts, bachelor of science, and civil engineer are conferred. The institution has a farm of 320 acres, and valuable apparatus and collections for imparting an industrial and scientific education. In 1874-'5 there were 10 instructors and 75 students.—The colleges and professional schools of the state, with the number of instructors and pupils in 1874-'5, were as follows:

INSTITUTIONS.	Where situated.	Denominations.	In what year opened.	No. of instructors.	Pupils in collegiate department.	Pupils in all departments.
Antioch college.....	Yellow Springs..	Unitarian.....	1853	10	43	120
Baldwin university.....	Berea.....	Methodist Episcopal.....	1856	18	179	288
Buchtel college.....	Akron.....	Universalist.....	1872	14	101	180
Capital university.....	Columbus.....	Evangelical Lutheran.....	1850	6	60	80
Cincinnati Wesleyan college.....	Cincinnati.....	Methodist Episcopal.....	1842	18	114	220
Denison university.....	Granville.....	Baptist.....	1831	10	87	162
Farmer's college.....	College Hill.....	Not denominational.....	1847	8	20	82
Franklin college.....	New Athens.....	United Presbyterian.....	1825	...	...	...
German Wallace college.....	Berea.....	Methodist Episcopal.....	1864	7	35	110
Heidelberg college.....	Tiffin.....	Reformed.....	1850	7	102	210
Hiram college.....	Hiram.....	Disciples.....	1867	8	37	233
Kenyon college.....	Gambier.....	Protestant Episcopal.....	1825	13	52	69
Marietta college.....	Marietta.....	Not denominational.....	1835	10	85	183
Mount St. Mary's of the West.....	Cincinnati.....	Roman Catholic.....	1851	15	318	112
Mount Union college.....	Mount Union.....	Methodist Episcopal.....	1858	16	688	809
Muskingum college.....	New Concord.....	Not denominational.....	1837	4	...	125
Oberlin college.....	Oberlin.....	Congregational.....	1833	63	159	1,380
Ohio Central college.....	Iberia.....	United Presbyterian.....	1854	3	15	50
Ohio university.....	Athens.....	Not denominational.....	1804	6	43	109
Ohio Wesleyan university.....	Delaware.....	Methodist Episcopal.....	1844	12	159	376
One Study university.....	New Mark't Stat'n	Methodist Episcopal.....	1859	4	...	217
Otterbein university.....	Westerville.....	United Brethren in Christ.....	1847	11	75	205
Richmond college.....	Richmond.....	Not denominational.....	1835	4	...	...
St. Xavier college.....	Cincinnati.....	Roman Catholic.....	1831	16	159	272
University of Wooster.....	Wooster.....	Presbyterian.....	1870	27	155	306
Urbana university.....	Urbana.....	New Church.....	1851	4	10	25
Western Reserve college.....	Hudson.....	Not denominational.....	1826	16	66	133
Wilberforce university.....	Xenia.....	Afric'n Method't Episcopal.....	1856	...	...	...
Wilmington college.....	Wilmington.....	Friends.....	1870	4	15	79
Willoughby college.....	Willoughby.....	Methodist.....	1858	5	25	150
Wittenberg college.....	Springfield.....	Evangelical Lutheran.....	1845	10	100	163
Xenia college.....	Xenia.....	Methodist Episcopal.....	1850	7	122	271
SCHOOLS OF LAW.						
Law school of Cincinnati college.....	Cincinnati.....	.....	1833	4	65	...
Ohio state and union law school.....	Cleveland.....	.....	1856	...	...	...
SCHOOLS OF MEDICINE.						
Cincinnati college of medicine and surgery.....	Cincinnati.....	Regular.....	1821	14	...	...
Cincinnati college of pharmacy.....	.....	Pharmaceutic.....	1871	3	76	...
Cleveland medical college.....	Cleveland.....	Regular.....	1842	15	66	...
Eclectic medical institute.....	".....	Eclectic.....	1843	...	...	...
Homoeopathic hospital college.....	".....	Homoeopathic.....	1849	13	70	...
Medical college of Ohio.....	Cincinnati.....	Regular.....	1819	10	282	...
Miami medical college.....	".....	".....	1852	12	...	...
Ohio college of dental surgery.....	".....	Dental.....	1845	7	88	...
Pulte medical college.....	".....	Homoeopathic.....	1872	14	56	...
Starling medical college and hospital.....	Columbus.....	Regular.....	1848	8	65	...
SCHOOLS OF THEOLOGY.						
Lane theological seminary.....	Cincinnati.....	Presbyterian.....	1833	5	48	...
Mount St. Mary's of the West.....	".....	Roman Catholic.....	1851	7	...	...
St. Mary's theological seminary.....	Cleveland.....	Roman Catholic.....	1849	3	30	...
Theological seminary.....	Xenia.....	United Presbyterian.....	1794	...	...	...
Theological seminary of the Evangelical Lutheran joint synod of Ohio.....	Columbus.....	Evangelical Lutheran.....	1830	...	...	...
Theological seminary of St. Charles Borromeo.....	Carthage.....	Roman Catholic.....	1860	8	43	...
Union Biblical seminary.....	Dayton.....	United Brethren in Christ.....	1871	8	25	...

The system adopted by the One Study university enables students to complete one study before beginning another. The Cincinnati Wesleyan college is exclusively for females. Both sexes are admitted to Antioch, Hiram, Mount Union, Oberlin, Ohio Central, One Study university, Otterbein, Richmond, and the university of Wooster. Besides these, there are numerous seminaries of a high order for the superior instruction of females. In addition to the professional schools above named, there is a law department in Wilberforce university; a medical department (in Cleveland) of the university of Wooster; a college of pharmacy connected with Baldwin university; scientific departments of Denison university and Oberlin college; and theological departments of Ger-

man Wallace college, Heidelberg college, Mount St. Mary's of the West, Oberlin college, Wilberforce university, and Wittenberg college. The Toledo university of arts and trades has recently been organized for advanced artistic and industrial instruction of young men and women. The number of libraries in 1870 was 17,790, with an aggregate of 3,687,363 volumes. Of these, 11,765 with 2,353,000 volumes were private, and 6,025 with 1,334,363 volumes other than private; 3 town, city, &c., 61,000; 1,118 school, college, &c., 426,013; 4,896 Sabbath school, 796,650; and 5 circulating, 8,500. The largest libraries are the public in Cincinnati, which in 1874 had 62,000 volumes; the state in Columbus, 39,000; the mercantile in Cincinnati, 35,500; and the library of Marietta

college, with 26,000 volumes. St. Xavier college, Mount St. Mary's of the West, Ohio Wesleyan university, Denison university, Western Reserve college, and Oberlin college have also large libraries. The Cincinnati law library contains about 10,000 volumes. The whole number of newspapers and periodicals in 1870 was 395, having an aggregate circulation of 1,388,367, and issuing annually 98,548,814 copies. There were 26 daily, with a circulation of 139,705; 8 tri-weekly, 13,560; 3 semi-weekly, 7,200; 299 weekly, 923,502; 8 semi-monthly, 65,050; 47 monthly, 228,750; 2 bi-monthly, 2,700; and 2 quarterly, 7,900. In 1874 the total number reported was 505, viz.: 29 daily, 10 tri-weekly, 5 semi-weekly, 386 weekly, 1 bi-weekly, 12 semi-monthly, 61 monthly, and 11 quarterly.—The total number of religious organizations in 1870 was 6,488, having 6,284 edifices with 2,085,586 sittings, and property valued at \$25,554,725. The denominations were represented as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Property.
Baptist, regular.....	555	545	164,020	\$2,533,000
“ other.....	158	157	38,850	225,500
Christian.....	631	610	167,625	1,366,990
Congregational.....	198	195	87,150	1,385,585
Episcopal, Protestant...	114	112	51,150	1,343,280
Evangelical Association...	157	140	33,500	383,500
Friends.....	91	91	26,050	218,770
Jewish.....	7	7	4,000	360,584
Lutheran.....	477	476	131,050	1,392,975
Methodist.....	2,161	2,115	714,146	6,540,910
Moravian.....	4	4	1,200	14,000
New Jerusalem (Swe-				
denborgian).....	8	6	1,350	55,000
Presbyterian, regular....	623	625	233,945	3,580,756
“ other.....	164	165	60,000	564,970
Reformed church in				
America (late Dutch	2	2	700	9,500
Reformed).....				
Reformed church in the				
United States (late	238	266	88,900	887,700
German Reformed)....				
Roman Catholic.....	295	295	160,700	3,959,970
Second Advent.....	1	1	300	1,000
Shaker.....	4	4	2,100	16,000
Universalist.....	73	73	20,750	175,950
Unknown, local missions	2	2	200	600
“ union.....	33	33	8,600	34,775

—The first explorations in the territory which now constitutes the state of Ohio were made by the French, the discoveries of La Salle in this region dating from about 1680. The object of the French adventurers, however, seems to have been trade rather than settlement. They were soon involved in disputes with the English, who, having obtained from their sovereign a grant covering part of the territory claimed by the French, sent out surveyors, and established trading posts in the Ohio valley. It was in the war which broke out in consequence of these conflicting claims that Washington first became known; but neither his abilities nor the operations of a powerful force sent out under Gen. Braddock could overcome the French, who kept possession of the country until Canada and the whole country W. to the Mississippi were surrendered by the treaty of 1763. After the war of the revolution dis-

putes arose between several of the states respecting the right of soil in this territory, which were only allayed by the cession of the whole to the United States, Virginia reserving 3,709,848 acres near the rapids of the Ohio for her state troops, and Connecticut a tract of 3,666,921 acres near Lake Erie (the Western Reserve). In 1800 jurisdiction over these two tracts was relinquished to the federal government, the states retaining the right to the soil, and disposing of it in small lots to settlers, while the Indian titles to the rest of the state were bought up by the general government. In 1787 congress undertook the government, and in 1788 the first permanent settlement was made at Marietta. The first years of the Northwest territory, as it was called, were harassed by Indian warfare, which was not terminated until after the signal victory of Gen. Wayne in 1794. In 1799 the Northwest territory was organized, and shortly afterward Ohio was formed into a separate government. It was admitted into the Union as a state in 1803. From 1800 to 1810 the seat of government was in Chillicothe, from 1810 to 1812 in Zanesville, and from 1812 to 1816 in Chillicothe. Columbus became the capital in 1816. A convention to revise the constitution assembled in Columbus May 6, 1850, and finally adjourned March 10, 1851, a portion of the session having been held in Cincinnati. The amended constitution was ratified by the people June 17, 1851. Another convention to revise the constitution convened in Columbus May 14, 1873, and, having adjourned to Cincinnati, framed a new constitution, which was rejected by the people at the election of 1874. The whole number of troops furnished by Ohio to the Union army during the civil war was 317,133, or 239,976 reduced to a three years' standard. The first geological survey of Ohio was made in 1837-'8, under the supervision of Prof. W. W. Mather, chief geologist. A more complete survey was begun in 1869 and completed in 1874, by Prof. J. S. Newberry as chief and E. B. Andrews, Edward Orton, and John H. Klippart as assistant geologists. Besides the reports of progress for 1869, 1870, and 1871, two volumes of the final report, each in two parts (geology and palæontology), have been published. The publications yet to be made comprise volumes on geology, on economic geology, on zoölogy and botany, and a geological map. (See supplement.)

OHIO. 1. A N. W. county of West Virginia, bounded E. by Pennsylvania and W. by the Ohio river, and drained by Wheeling and other small creeks; area, 140 sq. m.; pop. in 1870, 28,831, of whom 444 were colored. Its surface is hilly and the soil fertile, especially along the Ohio. Most of the land is well adapted to pasturage. Mines of bituminous coal among the hills are extensively worked. It is intersected by the Baltimore and Ohio railroad. The chief productions in 1870 were 42,276 bushels of wheat, 225,465 of Indian corn, 97,372 of oats,

26,967 of barley, 46,748 of potatoes, 120,135 lbs. of butter, 175,124 of wool, and 8,389 tons of hay. There were 1,637 horses, 1,585 milch cows, 1,493 other cattle, 47,201 sheep, and 4,153 swine; 23 manufactories of iron in various forms, and many other manufacturing establishments, chiefly at the capital, Wheeling.

II. A W. county of Kentucky, bounded S. by Green river, which is here navigable by steamboats, and intersected by Rough creek; area, about 500 sq. m.; pop. in 1870, 15,561, of whom 1,393 were colored. It has an undulating surface and a fertile soil, and contains iron ore and coal. The Elizabeth and Paducah railroad passes through it. The chief productions in 1870 were 40,321 bushels of wheat, 577,371 of Indian corn, 96,268 of oats, 28,033 of Irish and 16,870 of sweet potatoes, 177,229 lbs. of butter, 42,567 of wool, 3,392,633 of tobacco, and 3,564 tons of hay. There were 5,325 horses, 3,801 milch cows, 6,329 other cattle, 21,308 sheep, and 30,646 swine. Capital, Hartford.

III. A S. E. county of Indiana, bounded E. by the Ohio river, which separates it from Kentucky, and N. W. by Laughery creek; area, about 90 sq. m.; pop. in 1870, 5,837. The surface rises in some places into high hills, but in very few places is it too much broken for cultivation. The soil, resting mainly on blue limestone, is fertile. The chief productions in 1870 were 61,833 bushels of wheat, 12,231 of rye, 221,565 of Indian corn, 10,224 of oats, 13,581 of barley, 89,379 of potatoes, and 6,489 tons of hay. There were 1,234 horses, 1,150 milch cows, 1,286 other cattle, 2,742 sheep, and 4,342 swine. Capital, Rising Sun.

OHIO RIVER, the largest branch of the Mississippi river from the east, known to the early French settlers as *la belle rivière*, and famed for the uniform smoothness of its current as well as for the beauty and fertility of its valley. It is formed in the W. part of Pennsylvania by the junction at Pittsburgh of the Monongahela and Alleghany rivers. By the latter the drainage valley of the Mississippi is extended into the S. W. part of New York, and in Potter co., Pa., reaches a point where over an extent of a few acres it is a mere chance whether the water that falls upon the surface reaches the ocean by the gulf of Mexico, the gulf of St. Lawrence, or Chesapeake bay. The course of the Ohio and of all its tributaries, from their sources W. of the Alleghanies to the outlet of the river in the Mississippi, at Cairo, Ill., is through a region of stratified rocks, little disturbed from the horizontal position in which they were deposited, and nowhere intruded upon by uplifts of the azoic formations, such as in other regions impart grandeur to the scenery and variety to the valleys of the rivers. Over an area of drainage of the Ohio and its branches estimated at 214,000 sq. m., the topography is uniform in its principal features, and, though often beautiful, still for the most part tame. The valleys are depressions below the general summit level of

the country; all of them were eroded by currents of water, and the piles of strata presenting no portions that could resist the action of these, the descent of the river beds is gentle, with no sudden breaks or precipitous falls. The banks, however, are often steep, and in many places, especially upon the smaller rivers, the waters have worn a narrow passage between vertical cliffs of limestone to the depth of several hundred feet from their summits. Generally the rivers spread out to considerable width, and in dry seasons become shoal to the serious impediment of navigation. An interesting feature in the banks of the Ohio is the succession of terraces often noticed rising one above another at different elevations, and sometimes spreading out in broad alluvial flats. Though they are often 75 ft. or more above the present mean level of the river, they were evidently formed by fluvial deposits made in distant periods, when the river flowed at these higher levels. Evidence is altogether wanting to fix the date of these periods. Upon the lower branches of the river, at the level of present high water, are mounds and earthworks wonderful in their numbers and extent, which were constructed, as far as can be ascertained from various proofs, full 2,000 years since, the fact being thus established that the river must have flowed at its present level at least so far back. The city of Cincinnati stands upon two of these terraces, the upper one 52 ft. above the lower, and this 60 ft. above low water of the river. In the gravel of the upper one have been found the teeth of an extinct species of elephant. Shells which have been found at corresponding elevations are of recent species, such as are still common to the waters in the neighborhood.—The total length of the Ohio river is 975 m.; but from Pittsburgh to the mouth of the river in a straight line it is less than three fifths of that distance. Its course till it passes out of Pennsylvania is N. N. W. to Beaver, and thence W. S. W. to the line of the state of Ohio. It then flows S. and S. W. between Ohio and West Virginia, passing Wheeling, 86 m. below Pittsburgh. The general course of the river is W. S. W. After passing between Ohio and West Virginia, it borders the whole length of Kentucky, separating that state from Ohio, Indiana, and Illinois on the north. The width of the upper third of the river, between Pittsburgh and Point Pleasant, is 1,000 ft. at low water and 1,200 ft. at high water, thence gradually increasing till near the mouth, where it is 3,000 ft. Its depth at different seasons is very fluctuating, the range between high and low water being often 50 and sometimes 60 ft., and the usual range throughout the entire river is 45 ft. During portions of the summer and in the autumn, when the water is low, the larger steamboats ascend no further than Wheeling, and even below this point they pass with difficulty, or are arrested by the sand bars, which, with the low sandy islands, called towheads,

badly obstruct the navigation. At the lowest stage, generally in August and September, the river may be forded at several places above Cincinnati. In the winter it is often frozen over, and for several weeks floating ice prevents its navigation. The rate of its current varies with the stage of the water from 1 to 3 m. an hour. The only rapids are at Louisville, and these are not insurmountable to all the steamboats. In $2\frac{1}{2}$ m. the fall is about 27 ft. A canal was long since constructed past these rapids at Louisville, through which steamers of 3,000 tons may pass.—The country bordering the Ohio is for the most part a thriving agricultural region, and many prosperous towns and cities have grown up within the present century on its banks. Manufactures are encouraged by the mines of coal and iron ore that abound in the country traversed by this river and its tributaries, and the products of these add largely to the immense transportation carried on by the boats. The character and extent of these operations are particularly noticed in the descriptions of the several states and large towns on the borders of the river.—The tributaries of the Ohio from both sides are numerous, and many of them are important rivers, as the Muskingum and Miami of Ohio, the Wabash of Indiana and Illinois, and the Sandy, Licking, Kentucky, Cumberland, Green, and Tennessee of Kentucky.

OHM, L. Georg Simon, a German physicist, born in Erlangen, March 16, 1787, died in Munich, July 7, 1854. He was the son of a locksmith, and in his boyhood worked in his father's shop. He studied at Erlangen, taught mathematics in various places, and in 1817 was appointed professor in the Jesuit college in Cologne. In 1818 he published a work on the elements of geometry. He devoted himself particularly to the investigation of the laws governing galvanic currents, and by a combination of mathematical and experimental investigation, carried on for many years, he at length discovered and established the law which forms the basis of the mathematical theory of electricity. (See GALVANISM.) His discoveries were first announced in 1825-'6 in scientific journals, and more completely in his *Die galvanische Kette, mathematisch bearbeitet* (Berlin, 1827; translated into English in Taylor's "Scientific Memoirs," vol. xi., London, 1841). The fundamental theorem of his doctrine is known as "Ohm's law." In 1826 he resigned his professorship, and was director of the polytechnic school in Nuremberg from 1833 to 1849, when he was appointed professor of physics at Munich. In 1841 the royal society of London conferred upon him the Copley medal. He also published *Elemente der analytischen Geometrie* (Nuremberg, 1849), *Grundzüge der Physik* (1854), and other works.

II. Martin, a German mathematician, brother of the preceding, born in Erlangen, May 6, 1792, died in Berlin, April 1, 1872. He studied at the university of Berlin, and in 1817 was ap-

pointed professor of mathematics and physics in the gymnasium at Thorn. In 1821 he removed to Berlin, and in 1839 became a full professor in the university. He delivered courses of lectures at the academy of architecture from 1824 to 1831, and at the schools of artillery and engineering from 1833 to 1852; and he also taught in the military school from 1826 to 1849. He published *Versuch eines vollkommen consequenten Systems der Mathematik* (9 vols., Nuremberg, 1822-'52); *Lehrbuch der Mechanik* (3 vols., Berlin, 1836-'8); *Geist der mathematischen Analysis* (2 parts, 1842-'5); the first part translated into English by A. J. Ellis, London, 1843); and *Die Dreieinigkeit der Kraft* (Nuremberg, 1856).

OHMACHT, Landolin, a German sculptor, born in Würtemberg about 1761, died in Strasburg, March 31, 1834. He was at first a joiner, studied under Canova in Rome, and settled in Strasburg in 1801. His principal works are: "The Judgment of Paris," in the royal garden at Munich; the statue of Neptune at Münster, and that of Desaix between Kehl and Strasburg; the mausoleum of the emperor Rudolph in the cathedral of Spa; the statue of Luther at Weissenburg, and that of "Venus leaving her Bath," which is regarded as his masterpiece. Among his best known busts are those of Lavater, Klopstock, Raphael, and Holbein.

OILS AND FATS, an important natural group of organic compounds found in the various parts of plants, particularly the seeds, and in animals, principally in the adipose tissues. (See ADIPOSE SUBSTANCES.) In vegetables there are two kinds of oils, totally distinct and having a different chemical formation, viz.: the fixed, which are analogous to the animal oils and fats, and the volatile or essential oils; and there is also a class of oils and fats which are the result of destructive distillation. These last and the volatile oils will be found treated under the heads COAL PRODUCTS, PARAFFINE, PETROLEUM, and ESSENTIAL OILS. The natural oils and fats, which alone are the subjects of this article, are now regarded as the compound ethers of glycerine, a triatomic alcohol (see GLYCERINE), and may be artificially formed by the action of this alcohol upon certain monobasic acids. The principal elements in their composition are carbon and hydrogen, oxygen entering as a constituent in smaller proportions; the solidity of the fatty body being generally in proportion to the amount of carbon, and its fluidity in proportion to that of oxygen. When separated from the organism the fatty bodies which are solid at ordinary temperatures are called fats, while those which are liquid are called oils. The fatty bodies taken from warm-blooded animals are generally solid at ordinary temperatures, but those obtained from fish and other cold-blooded animals are principally liquid. One of the distinguishing characteristics of the oils and fats is that they are lighter than water, the specific gravity varying from 0.91 to 0.94. They are chiefly com-

posed of three proximate principles, stearine, palmitine, and oleine, the first two being solid at ordinary temperatures, the last liquid. The mixture of the three therefore varies in softness according to the proportion of oleine which it contains. These proximate principles are compounds of the triatomic alcohol glycerine, acting as a base, and stearic, palmitic, and oleic acids, and may therefore be regarded as organic salts. It is to the investigations of Chevreul, made about 1820, that we owe our fundamental knowledge of the fatty bodies. Since then others, and particularly Berthelot, have extended his researches, and in the main confirmed their correctness. The nature of these bodies was well defined by Chevreul, but he regarded them as compounds of stearine, oleine, and margarine. It has however been shown by Heintz that Chevreul's margarine is not a simple fat, but a mixture of palmitine and stearine; for when it is saponified, the acid obtained from the soap is found to be a mixture of palmitic and stearic acids. The natural oils and fats may be heated to nearly 500° F. without much change; but they cannot be distilled without decomposition, by which they are distinguished from the volatile oils, the latter evaporating and distilling at various temperatures. At about 500° they begin to evolve acrid and offensive vapors, and at about 600° they are decomposed with evolution of gaseous hydrocarbons. When heated with caustic alkalies they undergo a peculiar change called saponification or conversion into soap, during which process glycerine is liberated, while the alkali combines with the oleic, stearic, and palmitic acids. (See SOAP.) All the natural oils and fats are soluble in ether, and to a certain extent in alcohol. Oil of turpentine and benzole also readily dissolve them, and they mix with each other in all proportions.—The fixed oils are divided into drying and non-drying oils. Drying oils when exposed to the air thicken from absorption of oxygen, being converted when spread upon surfaces into a tough transparent membrane or varnish. Linseed, nut, hemp, and poppy oils belong to this class, and contain an oleine which differs from that of the non-drying oils, yielding by saponification, instead of oleic, linoleic acid or one similar to it. (See DRYING OILS, and LINSEED OIL.) The non-drying oils are also gradually altered by exposure to the air, but in a different way; they lose much less fluidity, become acid, and acquire an acrid, disagreeable taste. This alteration, however, never takes place in pure glycerides, as pure stearine, palmitine, or oleine, or mixtures of them; but only when other organic matters, such as the cellular substance of the plant or animal in which the oil naturally exists, are present. These substances contain nitrogen, and act as ferments, producing decomposition of a part of the fatty matter with which they are mixed; by this action stearic, palmitic, and oleic acids are set free, and small quantities of

certain volatile acids, as butyric, valeric, and caproic, are formed, probably from atmospheric oxidation. By treatment with boiling water, and afterward in the cold with a weak alkaline solution, rancid oils may be purified and restored to their original condition.—The uses of the fatty oils are extensive. The drying oils are used in the preparation of paints, varnishes, and cements. They are also used in medicine, often in the forms of liniment, as linseed oil in the lime-water liniment, or the *linimentum calcis* of the pharmacopœia, an excellent application to burns and abrasions of the skin. The non-drying oils are used in the manufacture of soap, for lubricating machinery, for illumination by various methods, for the preparation and preservation of food, and also in medicine.

OISE (anc. *Isara* and *Esia*), a river of France, which rises in the province of Hainaut in Belgium, near the French frontier, flows S. W. through the departments of Le Nord, Aisne, Oise, and Seine-et-Oise, and joins the Seine 12 m. N. W. of Paris, after a course of about 150 m. Its principal tributaries are the Noirieu, Brèche, and Thérain on the right, and the Ton, Serre, Lette, Aisne, Autonne, and Nonette on the left. It communicates by canals with the Somme, the Sambre, and the Scheldt. The principal towns on its banks are La Fère, Noyon, Compiègne, and Pontoise.

OISE, a N. department of France, formed from parts of the old provinces of Isle-de-France and Picardy, bordering on Somme, Aisne, Seine-et-Marne, Seine-et-Oise, Eure, and Seine-Inférieure; area, 2,261 sq. m.; pop. in 1872, 396,804. The chief rivers are the Oise and its tributaries the Aisne, Nonette, and Thérain. The Epte passes through the W. part, and the Oureq through the S. E. The surface is low and undulating, and the soil consists in general of strong clay, but there are sandy barrens. The chief crops are wheat, flax, hemp, and rape. The wine is of inferior quality, and there are few vineyards. Wool-lens, linen, canvas, and beet sugar are manufactured. The department is divided into the arrondissements of Beauvais, Clermont, Compiègne, and Senlis. Capital, Beauvais.

OJIBWAYS, or **Chippewas**, a tribe of the great Algonquin family, living in scattered bands on the shores of Lake Huron and Lake Superior, La Pointe being the central point. They became known to the French about 1640, the earliest band reached being that at Sault Ste. Marie, from which fact they received the name Sautaux, still applied to them by the Canadian French. In 1642 Fathers Jogues and Raymbaut began a mission at Sault Ste. Marie, where they numbered 2,000. The Ojibways are tall, well developed, good-looking, brave, expert hunters, little given to agriculture, and fond of adventure. From early times they were at war with the Foxes, Sioux, and Iroquois. They drove the Sioux from the head waters of the Mississippi and from the Red river of the North,

and always defeated them in the wooded country, though generally worsted on the plains. Their numbers were so reduced by war that when the French missions were restored about 1660 only 550 Ojibways were found in four bands at the Sault. They contributed their quota to many expeditions of the French, and were always devoted to them down to the close of French rule. They took part in Pontiac's war, and surprised Mackinaw. During the revolutionary war they were under British influence, but made peace by the treaties of Fort McIntosh in 1785 and Fort Harmar in 1789. Subsequently they joined the Miamis in their hostilities, till Wayne reduced them, when they again made peace at Greenville, Aug. 3, 1795. Some of them had moved as far east as Lake Erie, but they gave up most of their lands there in 1805. In the second war with England they were again hostile, but they took part in the general pacification of the tribes in 1816, and the next year finally relinquished all their lands in Ohio. In 1822 there were 5,669 Ojibways at Saginaw, 8,335 along the Lake Superior line from Mackinaw to the Mississippi, and 550 mixed with other tribes. The limits of the vast territory belonging to them were fixed by treaty in 1825. In 1830 the United States interposed to arrest the immemorial war between them and the Sioux. Like other tribes, they gradually ceded lands to government, and in 1837 and 1842 the United States agreed to pay them for 25 years \$22,000 in money, \$29,500 in goods, and \$18,700 in other forms, as well as a sum of \$45,000 to the half-breeds, besides paying off debts against them amounting to \$145,000. By 1851 all but a few bands had been removed west of the Mississippi, and these bands ceded all except moderate reservations. In 1866 the Mississippi bands numbered 2,166; the Pillagers and Winnebagoishish, 1,899; the Red Lake, 1,183; the Pembina, 931; the Lake Superior bands, 5,558; and those mixed with other tribes probably 2,000 more. These differed much in their state of civilization and improvement. The Lake Superior bands and those in Michigan were generally peaceful, industrious, and far advanced, having been for years under salutary missionary influence. The Red Lake band were still chiefly hunters, and cultivated little; the Pembinas were much corrupted by bad whites; the Pillagers and Winnebagoishish were restless and lawless. The Ojibways of the Mississippi still possess large tracts of land, and many of the others are scattered on reservations, amounting in all to more than 5,000,000 acres, as established by treaties between September, 1854, and March, 1867. The liability of government to them in 1872 was about \$750,000. In the Dominion of Canada in 1871 there were 1,974 Ojibways at Sarnia, Snake island, Rama, Sandy island, Saugeen, and Cape Croker; 1,502 on the N. shore of Lake Superior; and some mingled with other tribes on the Thames and Walpole island. Some of the missions early established among the Ojibways by Catholics

are still maintained; there are also Methodist, Episcopal, and Presbyterian missions; but most of them are still pagans.—The manners, customs, traditions, and language of the Ojibways have been investigated by many, and they are better known than those of any other tribe. Schoolcraft and others popularized the information. They believe in Kitche Manitou, the Great or Good Spirit, and Matchi Manitou, the evil spirit. The Medas are a body acting as a priesthood; but each one has his own manitou revealed to him in dreams. Their great mythological personage is Menabojo, who aids the Great Spirit in creating the world. Their industry reached its highest point in the making of mats and canoes. Of their language there is a dictionary by Bishop Baraga, grammars by him and the Rev. G. A. Belcourt, and treatises less complete by Schoolcraft and others. The number of works printed in it, including a newspaper, is large. Their history has been written vaguely by George Copway, a native Ojibway ("Traditional History of the Ojibway Nation," Boston, 1851), and also by Peter Jones, another member of the tribe ("History of the Ojibway Indians," London, 1861).

OKA, a river of central Russia, one of the principal affluents of the Volga. It rises about 40 m. S. of Orel, in the government of the same name, passes that town, and flowing with a swift current N., N. E., S. E., and N. E. through the governments of Tula and Kaluga, on the border of Moscow, and through Riazan, Tambov, Vladimir, and Nizhegorod, joins the Volga at the town of Nizhni-Novgorod. Its total course is about 800 m., almost all navigable.

OKANAGANS, a tribe of the Sushwap branch of the Selish family of American Indians, living on a river that bears their name in Washington territory, E. of the Cascade mountains. They were called Cutsanim by Lewis and Clarke, and have always been friendly. They cultivate some corn, wheat, and potatoes, but depend chiefly on fish, roots, and berries. They lost greatly by disease in 1830. Missions were established among them in 1846, when they numbered 685. They are now reduced to 340. They had a peculiar weapon like a slungshot, a cylinder with a round stone at the end, both sewed in leather. One end was fastened to the wrist when in use. They strapped their dead to trees.

O'KEEFFE, John, an Irish dramatist, born in Dublin, June 24, 1747, died in Southampton, England, Feb. 4, 1833. He wrote a comedy at the age of 15, and was an actor for 12 years. In 1781 he went to London, and between that year and 1798 composed nearly 50 comedies, comic operas, and farces. Several of these were very popular, especially "The Castle of Andalusia," "Wild Oats," "The Poor Soldier," "The Young Quaker," and "Peeping Tom." In his 50th year O'Keefe became blind. In 1826 he published his "Recollections, or Autobiographical Memoirs." In 1828 he removed to Southampton.

OKEGHEM, or **Ockenheim**, Jan, a Flemish musician, born about 1430, died about 1513. Most of his life was spent in France, where he held important civil offices under three kings. The invention of the canon and of artificial counterpoint has been attributed to him, but this is an error. His masses, motets, and chansons possess high merit. Pupils came to him from every part of Europe, among them Josquin des Prés, Pierre de la Rue, Brumel, Gaspard, and Verbonnet.

OKEN, **Lorenz**, a German naturalist, born at Bohlsbach, Württemberg, Aug. 1, 1779, died in Zürich, Aug. 11, 1851. His real name was Lorenz Ockenfuss, which he abridged to Oken when he became a private teacher at Göttingen. He had studied natural history and medicine at the university of Würzburg. In his *Grundriss der Naturphilosophie* (8vo, 1802) he maintained that animal classes are simply a representation of the organs of sense, and divided the animal kingdom accordingly into five classes. In *Die Zeugung* (1805) he advanced the doctrine that all organic beings originate from and consist of vesicles or cells. In his *Beiträge zur vergleichenden Zoologie, Anatomie und Physiologie* (1806) he demonstrated that the intestines originate from the umbilical vesicle, and that this corresponds to the vitellus or yolk bag; in the same work he described the *corpora Wolffiana* or primordial kidneys. In 1807 he became extraordinary professor of the medical sciences at Jena, his celebrated inaugural discourse, *Ueber die Bedeutung der Schädelknochen*, being delivered in the presence of Goethe, who as rector of the university had invited him thither, and from whom he has been unjustly accused of borrowing his vertebral theory of the skull. The first edition of his *Lehrbuch der Naturphilosophie* was published in 1808-'11, a second in 1831, and a third in 1843; the last was translated into English by Dr. Tulk (London, published by the Ray society, 1847). In 1810 he was made court councillor, and in 1812 ordinary professor of natural sciences at Jena. In 1816 he commenced the publication of his celebrated periodical, the *Isis*, devoted principally to natural science. His political criticisms led the court of Weimar to require him either to suppress the *Isis* or to resign his professorship; he chose the latter alternative, and published his journal (prohibited at Weimar) at Rudolstadt uninterruptedly till 1848. Accused in 1819 of being a member of a forbidden secret democratic society, he was tried and acquitted, and thereupon retired to private life. In 1828 he resumed his occupation of private teacher in the newly established university at Munich, and soon after was appointed professor there. In 1832, on the proposition of the Bavarian government to transfer him to a provincial university, he resigned his appointments, went to Switzerland, and in 1833 was appointed professor of natural history in the university of Zürich, which post he retained until his death.

A statue has been erected in his honor in the university of Jena. His views on philosophical anatomy will be found under that title.

OKHOTSK, a town of Siberia, Russia, formerly the capital of a province of the same name, and since 1858 of a district in the littoral province (see PRIMORSK), situated on a narrow tongue of land projecting into the sea, at the mouths of the Okhota and Kukhtui rivers, lat. 59° 21' N., lon. 143° 17' E.; pop. about 200. It consists of a collection of ill built log houses, standing on a low shingly beach, and contains a church and a telegraph station. It was formerly of considerable importance, its decay being due to the acquisition of the Amoor country by Russia.

OKHOTSK, **Sea of**, an arm of the N. Pacific ocean, encircled by Kamtehatka, the Kurile islands, the Japanese island of Yezo, the Russian island of Saghalien, and the district of Okhotsk. It is about 1,000 m. long and 600 broad, and contains several islands. It forms numerous gulfs, and several rivers fall into it. By the gulf of Amoor, which receives the river of that name, it communicates with the sea of Japan. The shores are covered with ice from November to April, but the main expanse continues open. It is generally deep, without shoal or sand bank, and is subject to fogs and storms.

OKRA, the common name for *hibiscus esculentus*, a plant of the mallow family. Some regard it as a native of the East Indies, but De Candolle thinks the common name, also given okkoro, okro, and okra, points to a tropical American origin. It was formerly known as *Abelmoschus*, a genus so little distinct from *hibiscus* that it is now merged in it. Okra is



Okra (*Hibiscus esculentus*).

an annual with the general aspect of plants of the mallow family; its usually simple stem is from 2 to 6 ft. high, with rounded heart-shaped, five-lobed leaves, in the axils of which are large yellowish flowers with a purplish centre, from which the calyx early falls away.

The fruit is a narrow, pyramidal, ten-angled pod, 4 to 8 in. long, sharply pointed, and containing numerous kidney-shaped seeds. There are dwarf varieties only a little over 2 ft. high with shorter pods. Okra is cultivated for its young pods, which abound in mucilage; their principal use is to impart a thickening to soups and to form a peculiar southern dish called gumbo. (See GUMBO.) They are sometimes simply boiled and dressed like asparagus, and are much esteemed by those accustomed to them. Okra will grow in any good garden soil, and may be sown in place or transplanted from a hotbed, giving the plants plenty of room. The dwarf varieties are best suited to northern gardens. The pods must be gathered when perfectly tender, before any woody fibre has formed in them; and if any become too old for use they should be removed, that the plants may continue to produce. For winter use the pods are put down in salt, the same as cucumbers, or are sliced and dried. Among the many substitutes that have been proposed for coffee are the seeds of okra. The mallow family generally have tough fibrous inner bark, and that of the okra affords a very handsome fibre; it has been proposed for paper stock.

OKTIBBEHA, a N. E. county of Mississippi, drained by branches of the Tombigbee river; area, 576 sq. m.; pop. in 1870, 14,891, of whom 9,304 were colored. The surface is nearly level, and the soil very productive. The chief productions in 1870 were 5,198 bushels of wheat, 334,463 of Indian corn, 23,627 of sweet potatoes, 6,288 bales of cotton, 48,787 lbs. of butter, and 1,329 tons of hay. There were 1,237 horses, 1,705 mules and asses, 2,296 milch cows, 3,877 other cattle, 2,105 sheep, and 14,555 swine. Capital, Starkville.

OLAF, *Saint*, king of Norway, killed in battle, July 29, 1030. He was the son of Harald Gränske, and grandson of Harald the Fair-Haired, and was educated by Sigurd Syr, the chief of an upland district, who married the young prince's widowed mother. At the age of 12 Olaf commanded a piratical expedition to the British coasts, where he assisted the Anglo-Saxons in opposing the Danes; and at the age of 16 he had been engaged in nine great battles. In his career as a viking he visited Sweden; and once, being blockaded by the Swedes within the Mælar lake, he escaped by cutting a canal to the sea. For the next two years he infested the shores of France and Spain; and at length returning to Norway during the absence of Eric (1014), then engaged in the wars of Canute in England, he made himself master of the kingdom to the great joy of the Christians, and soon rendered it independent of both Sweden and Denmark. In his zeal for the Christian faith, he burned the heathen temples, erecting churches on the ruins, and marched through his dominions at the head of an army, compelling submission to the new faith. He forbade all piracy, and enforced his law so rigorously that, although the

vikings were sons of his most powerful subjects, he punished the offenders with loss of life or limb. His severity provoked rebellion, and while quelling this he was suddenly attacked by Canute the Great, who laid claim to Norway, landed an army at Drontheim, and conquered the kingdom. Olaf fled with his infant son Magnus to Russia; but two years afterward (1030), assisted by the king of Sweden, he entered Norway from the north, gave battle to the Danes near Drontheim, and fell in the thick of the fight, with most of his followers and kinsmen. The body of the king was secretly buried by one of his adherents.

ÖLAND, an island in the Baltic, belonging to Sweden, from which it is separated by a narrow strait called Calmar sound; area, 519 sq. m.; pop. about 40,000. It contains several villages, and the town of Borgholm, the capital. The E. shores are high and steep, and the W. low. The interior consists chiefly of barren sand hills, and in the north there are a few small lakes. A great part of the surface is covered with fine forests; and a strip of land along the coast is cultivated. Cattle and sheep are extensively reared. Öland is famous for its diminutive ponies.

OLBERS, *Heinrich Wilhelm Matthäus*, a German astronomer, born at Arbergen, near Bremen, Oct. 11, 1758, died in Bremen, March 2, 1840. He was a practising physician, and made his observations from an upper chamber of his dwelling in Bremen, with an ordinary hand telescope. He applied himself especially to the study of comets, and in 1779 discovered a method of calculating their orbits which was greatly superior to those previously in use. He computed the orbits of the comets of 1781, 1795, 1798, 1799, 1802, and of the great one of 1811. He also made investigations respecting the existence of the small planets whose orbits lie between Mars and Jupiter. Kepler had suggested that a planetary body might occupy this space; and with a view of verifying this suggestion, an association of 24 astronomers, including Olbers, divided up the zodiac among themselves for independent scrutiny. On Jan. 1, 1801, the small planet Ceres was discovered by Piazzi of Palermo, who was not a member of the association; and on March 28, 1802, Olbers discovered in the northern part of the constellation Virgo the planet Pallas. This led Olbers to conjecture that they were fragments of a larger planet once existing there, and that probably other portions might be found moving in nearly the same orbit; but he said he advanced the hypothesis merely to serve as a guide in making observations. (See ASTEROIDS.) He accordingly explored carefully, every month, the two opposite regions of the heavens in which the orbits of the new planets intersected, and where he supposed the fragments of the shattered planet must pass. In September, 1804, M. Harding of Bremen accidentally discovered a third planet, Juno. Olbers continued his search with re-

newed ardor, and on March 29, 1807, discovered a fourth, Vesta. In March, 1815, he discovered near Perseus a comet having no visible nucleus, and in 1828 published a dissertation on the possibility of a collision between a comet and the earth. His library, which contained perhaps the most extensive collection in existence of works in regard to comets, was purchased by the Russian government for the observatory of Pulkova.

OLDCASTLE, Sir John, Baron Cobham, an English reformer, born in the reign of Edward III., executed Dec. 14, 1417. He acquired the title of baron through his wife, the granddaughter and heiress of Lord Cobham, and fought with distinction in France. Having become a convert to the doctrines of Wycliffe, he promoted them greatly; and when the king reasoned with him, he said: "Next to God I profess obedience to my king; but as to the spiritual dominion of the pope, I can pay him no obedience." Thereupon he was confined in the tower and condemned to the flames, but escaped into Wales. A bill of attainder was passed against him, a reward of 1,000 marks offered for his head, and exemption from taxes promised to any town that should secure him. After four years he was discovered and carried to London, where he was hanged in chains on a gibbet in St. Giles's fields, and roasted to death by a fire kindled under him. He wrote "Twelve Conclusions addressed to the Parliament of England," besides several religious tracts and discourses.—See "Chronicles of the Examination and Death of Sir John Oldcastle," by Bishop Bale (London, 1554; reprinted, 1729).

OLD CATHOLICS, the name assumed in 1870 (after the precedent of the Jansenists of Holland) by members of the Roman Catholic church who denied the œcumenical character of the Vatican council and rejected its decrees, especially that concerning the infallibility of the pope, as contrary to the ancient Catholic faith. Before this council proclaimed papal infallibility as a doctrine of the Catholic church (July 18, 1870), the majority of the bishops of Germany and of the Austro-Hungarian monarchy opposed its promulgation as inopportune; but after the council's decision nearly all the bishops at once submitted; and at length every bishop of the Catholic church had given in his adhesion, except a few bishops of the United Armenian church, who even before the convocation of this council had fallen out with the pope on questions relating to the administration of the Armenian church, and had therefore not attended the council. While the German bishops submitted, an unflinching opposition manifested itself on the part of several theologians and a portion of the laity of Germany. A few days after the proclamation of the doctrine of infallibility, Prof. Michelis, of the lyceum of Braunsberg in East Prussia, issued a manifesto charging the pope with heresy and apostasy from the old Catholic church. Shortly afterward 44 professors of

the university of Munich, including Dr. Döllinger, joined in a protest against papal infallibility and the binding authority of the Vatican council. Many of the Catholic professors at Bonn, Breslau, Freiburg, and other universities and gymnasia soon followed this example. A number of prominent theologians and professors of the canon law met in August at Nuremberg, and agreed upon a joint protest against the œcumenical character of the Vatican council and the validity of its decrees. Among the signers were Döllinger and Friedrich of the university of Munich, Reinkens, Baltzer, and Elvenich of Breslau, Reusch, Knoodt, and Langen of Bonn, Schulte of Prague, Michelis of Braunsberg, and Lutterbeck of Giessen. In view of these indications of an incipient secession, the German bishops deemed it necessary, in a joint pastoral letter dated Sept. 10, to admonish all the faithful to submit to the decrees of the œcumenical council, as it was impossible for members of the Catholic church to dispute their validity. It was evident that the immense majority of the priests and the people sided with the bishops, for the expressions of dissent on the part of the laity were few. Only two congregations in all Germany (one in Bavaria and one in Silesia) joined their parish priests in a refusal to submit to the council. In several other places local committees were formed to prepare the way for an organization of the Old Catholics. The leaders of the movement were by no means agreed as to the course it ought to take. The breach between the Old Catholics and the heads of the church widened when the bishops began to deprive the Old Catholic professors of their ecclesiastical functions, to pronounce against them the greater excommunication, and to prohibit the theological students from attending their lectures. A few who at first had sympathized with the opposition to papal infallibility now receded from their position; but the majority remained firm in their resistance. By the excommunication of Döllinger (April 17, 1871), who had been the theological instructor of many of the German bishops, a new impulse was given to the efforts to effect a practical organization. Old Catholic societies were formed in nearly all the cities, and itinerant priests were engaged to preach to them. The municipal councils of several cities, like Munich, tried to promote the movement by removing from the educational institutions placed under their control all religious instructors avowing a belief in papal infallibility. On May 29 a number of prominent men met at Munich, under the presidency of Döllinger, and prepared a declaration of principles, which was generally accepted as the provisional ecclesiastical standard of the new church. This declaration says that the Old Catholics persist in rejecting papal infallibility and the Vatican doctrines which, notwithstanding the denial of the bishops, concede to the pope personal infallibility and absolute power in the

church; that they hope for a thorough reform of the constitution and life of the church, in which every civilized Catholic nation should constitute, in accordance with its peculiar character and mission, a free member, in which clergy and laity should harmoniously coöperate for developing the church life, and which by a thoroughly educated episcopacy and primacy should again be placed at the head of civilization. The declaration was signed by 31 prominent Old Catholics. A general Old Catholic congress met at Munich on Sept. 22, composed of about 300 delegates, representing all parts of Germany, the Austro-Hungarian monarchy, and Switzerland, and of friends of the cause from Holland, France, England, Russia, and other countries. Resolutions defining at length the profession of faith of the Old Catholics were adopted. This profession reasserts the claim of the Old Catholics to be regarded as members of the Catholic church; it not only rejects the Vatican decrees, but also claims for œcumenical councils infallibility only if their decisions agree with the original and traditional faith of the church as witnessed by the faith of the people and by theological science. It declares that there is no difference between the church of Utrecht (the so-called Jansenists) and the Old Catholics, and expresses a hope for a reunion with the Greek oriental and the Russian church, as the separation was not grounded in any insuperable dogmatical difference. Dr. Döllinger expressed a wish that the Old Catholics might keep strictly within the bounds of a protest against the obligatory character of the Vatican council, and that they be not organized into a separate church; but it was almost unanimously resolved to carry through an organized Catholic movement. As none of the Roman Catholic bishops of Germany had identified themselves with the movement, and the Old Catholics were as yet without a bishop of their own, the congregations of Bavaria in 1872 applied to the archbishop of the Old Catholic church of Holland for the sacrament of confirmation. The request was complied with, and thus the entire identity of the Old Catholic churches of Holland and Germany was established. At the second Old Catholic congress, held in Cologne in September, 1872, a plan for definitive organization was adopted. It was provided that as long as the Old Catholic church had no bishop of her own, the bishops of the Old Catholic church of Holland, and those bishops of the United Armenian church who occupied a similar position with regard to the pope, should be requested to perform episcopal functions for them. But at the same time the congress declared that the Old Catholics reserved to themselves the right of re-establishing a regular episcopal jurisdiction by the election of bishops, who should be chosen by the priests and the representatives of the congregations, and who were at the beginning to labor like the missionary bishops of the an-

cient church. A special committee was appointed, with Dr. Döllinger as chairman, to promote intercommunion with other churches, especially with the Eastern and Anglican, both of which were represented at this congress. The congress also reiterated the claim of the Old Catholics to be recognized by the state governments as the sole representatives of the Catholic church of Germany, and to be put in possession of the church property. This claim the governments of Germany, though strongly sympathizing with the movement, found it impossible to grant, in view of the comparatively small number of Old Catholics; and they adopted the policy of considering the movement as a conflict within the church, which did not concern the state. Accordingly they treated both parties as belonging to the Catholic church, and in several towns, especially in the grand duchy of Baden, a vote of the Catholic inhabitants was taken to ascertain the strength of each party; and where the number of Old Catholics was sufficiently large, one of the churches, or the joint use of one church, was given to them. The organization of the Old Catholic church as an independent body was completed by the election of a bishop on June 4, 1873, at Cologne. The choice fell almost unanimously on Dr. Reinkens, professor of theology in the university of Breslau, who on Aug. 11 was consecrated at Rotterdam by Bishop Heykamp of Deventer, of the Old Catholic church of Holland. The most important work done by the third Old Catholic congress, held at Constance, Sept. 12 and 13, was the adoption of a synodal constitution of the church, which in many points resembles that of the Protestant Episcopal church in the United States. The diocesan, provincial, and general synods of the Old Catholics will consist of the priests and lay delegates of the congregations, each lay delegate representing 200 constituents. The first synod of the church met at Bonn on May 27, 1874, and was attended by 28 priests and 60 lay delegates. The three congresses had declared themselves incompetent to deal with the demands for doctrinal and constitutional changes; the same had been done by the bishop; and the action of priests who, like Father Hyacinthe, had married without waiting for the abolition of celibacy by proper ecclesiastical authority, had been disapproved. There was a unanimous sentiment that whatever reforms it might appear desirable to introduce must proceed from the synod of the church. Among the subjects which engaged the attention of the first synod were auricular confession, fasting and abstinence, the marriage laws, and priestly celibacy. The synod resolved that the practice of private confession should be retained, but that it should be brought back to the principles of the ancient church, and be freed from the Roman corruptions. Similar resolutions were passed with regard to fasting and abstinence. The prohibition of marriages between Catholics and

Protestants, in cases where the Protestant refuses to consent to the education of the children in the Catholic religion, was abolished. Action on the proposed abolition of priestly celibacy was postponed. Committees were appointed for preparing a new ritual and a catechism. Six synodal examiners were elected, four of whom were priests and two laymen, and a "synodal representation" (standing committee) to represent the church until the meeting of the next synod. From a report made to this synod on the progress of the Old Catholic movement, it appears that at this time the Old Catholic church had in Prussia 31 congregations, 16 organized parishes, and a total population of about 15,000; in Bavaria, 54 societies and 5,000 people; and in Baden, 31 societies and 3,500 people. The number of Old Catholic priests in Germany was 41, and of students of theology 12. The original claim of the Old Catholics to be recognized by the state governments as the sole representatives of the Catholic church as it existed before 1870 had been abandoned; and the fourth Old Catholic congress, which was held on Sept. 6 and 7, 1874, at Freiburg in Baden, only demanded that wherever a formal separation between the adherents of the Vatican council and the Old Catholics should take place, the latter should receive a proportionate share of the church property. The legislature of Baden had already adopted this view by passing a law guaranteeing to the Old Catholics a share in the church property of every parish of the grand duchy, in proportion to their number. In the other German states the legal status of the Old Catholics was undefined by legislative action at the beginning of 1875; but it was expected that the principles adopted in Baden would prevail. A union conference of Old Catholic, eastern, and Anglican theologians met under the presidency of Dr. Dollinger at Bonn, Sept. 14-16, 1874. The members of the conference generally agreed that no insuperable difference of opinion on doctrinal questions existed. The Old Catholics as well as the Anglicans agreed with the orientals in the declaration that the manner in which the words *Filioque* were added to the Nicene creed was illegal, and that, with a view to future peace and unity, it is very desirable that the entire church should decide the question whether the creed can be restored to its original form without sacrificing a doctrine expressed in its present form in the occidental churches. The adoption of several theses on doctrinal questions indicated that the difference between Old Catholics and the Roman Catholic church, so far as the latter has given in its adhesion to the Vatican council, is no longer limited to papal infallibility. The most important points of difference, according to these theses, are the following: The apocryphal books of the Old Testament are declared to be not canonical in the same sense as the books contained in the Hebrew canon; no translation of

holy writ can claim a higher authority than the original text; divine service should be celebrated in a language understood by the people; the doctrine that superabundant merits of the saints can be transferred to others, either by the heads of the church or by the authors of the good works, is untenable; the number of sacraments was for the first time fixed at seven in the 12th century, and this became a doctrine of the church, not as a tradition received from the apostles or earliest times, but as the result of theological speculation; the new Roman doctrine of the immaculate conception of the Virgin is at variance with the tradition of the first 13 centuries; indulgences can only refer to penances which have really been imposed by the church herself. The special committees appointed by the Old Catholic congress were expected to continue the negotiations with the oriental and Anglican communions.—Outside of Germany, the Old Catholic movement has gained a firm footing only in Switzerland. The number of priests who joined it was small, but the support received from the governments of the Protestant and liberal cantons was much more vigorous than in Germany. Not only were those priests who joined the Old Catholic church with their congregations protected in their places against the bishops who excommunicated and deposed them, but some cantons, as Bern and Geneva, passed new laws regulating the affairs of the Catholic church; and where bishops and parish priests refused to recognize the new laws, they appointed Old Catholic priests. Thus all the Catholic churches of the canton of Bern were placed in the hands of the Old Catholics, although the immense majority of the people protested against this transfer. The same canton established in 1874, in connection with the university of Bern, a faculty of Old Catholic theology, which was opened in October. The movement in Switzerland has had in general more the character of an opposition to the influence of Rome than that of a religious reform. At the close of 1874 the church was still without a bishop, and grave dissensions had broken out between a more conservative and a more radical wing of the party, the latter of which had the ascendancy in the canton of Geneva. At a general assembly of the Old Catholic societies which was held at Olten in September, 1874, the main points of the church constitution, including the election of a bishop, were agreed upon. The convention rejected the name of Old Catholics, and preferred that of Christian Catholics (*Christkatholiken*). In Austria several congregations were formed, especially in the German districts of Bohemia; but although supported by the liberal parties in the parliament, they were up to the end of 1874 unable to obtain recognition by the state government. In France, Father Hyacinthe and the abbé Michaud took an active interest in the movement, but were unable to secure the formation of any large congregations. Spain, Italy,

England, and other countries were also represented at the Old Catholic congresses; but although some men of influence were among the sympathizers with the movement, like the Jesuit Passaglia in Italy and Lord Acton and Lord Camoys in England, no independent Old Catholic church has been founded in any of these countries.—The principal periodicals published in the interest of the Old Catholic church are *Der Deutsche Mercur* (a weekly), at Munich, and the *Theologisches Literaturblatt*, at Bonn. On the history and the aims of the church, see Reinkens, *Ueber den Ursprung der jetzigen Kirchenbewegung* (Cologne, 1872); Nippold, *Ursprung, Umfang, Hemmnisse und Aussichten der altkatholischen Bewegung* (Berlin, 1873); Père Hyacinthe, *De la réforme catholique* (Paris, 1872); and Michaud, *Programme de réforme de l'Eglise d'occident* (Paris, 1872).

OLDENBARNEVELDT. See BARNEVELDT.

OLDENBURG. I. A grand duchy of Germany, comprising three separate territories, which have the following areas and population:

DIVISIONS.	Area in sq. m.	Pop. in 1871.
Duchy of Oldenburg.....	2,075	243,978
Principality of Lübeck.....	200	34,353
Principality of Birkenfeld.....	194	36,128
Total.....	2,469	314,459

The duchy of Oldenburg is situated W. and S. W. of the river Weser, which forms its N. E. boundary. It is bounded N. by the North sea, a deep inlet of which forms the Jade bay, and E., S., and W. by the Prussian province of Hanover. The whole country is a perfect level, watered by the Weser, Hunte, Jade, Vechta, and other rivers, of which only the Weser is navigable. Of a number of lakes the largest and most picturesque is Zwischenahn lake. One seventh of the area consists of the most fertile bottom land, upon which all kinds of grain, fruit, potatoes, beans, peas, &c., thrive luxuriantly; the remainder of fair arable soil and pasture. Oldenburg is almost exclusively an agricultural country, and its manufactures are of little importance. Among the more important towns are Jever and Varel, in the north, the latter on the railroad which connects the capital, Oldenburg, with Bremen and Wilhelmshaven, the Prussian seaport on Jade bay. The principality of Lübeck is enclosed by the Prussian province of Schleswig-Holstein and the territory of the free city of Lübeck. It consists of the city of Eutin, and one borough and 82 villages grouped around the banks of the lake of Eutin. Up to 1802 it was an independent bishopric. The principality of Birkenfeld lies in the southern part of the Prussian province of the Rhine, on the left bank of the Rhine. (See BIRKENFELD.)—The grand duchy has a common constitution for its three component parts, and provincial councils for Lübeck and Birkenfeld. The diet of the grand duchy consists of a sin-

gle chamber, numbering 33 deputies, who are elected for three years by the vote of all citizens paying taxes. The executive is vested, under the grand duke, in a responsible ministry of three departments. The state debt in 1873 was \$8,416,000. In the budget of the central government of Oldenburg for 1873, the revenue and the expenses were estimated at \$202,000 each. The aggregate revenue of the special budget of the three divisions of the grand duchy was estimated at \$1,800,000; the expenditure at \$1,420,000. The movement of shipping in 1872 was as follows: vessels entered, 2,007, tonnage 161,480; cleared, 2,134, tonnage 159,570. These figures do not include the coasting trade, in which 4,925 vessels entered, tonnage 186,586, and 4,821 cleared, tonnage 186,048. The merchant shipping of the grand duchy in 1872 embraced 542 vessels, aggregate burden 71,547 tons. The troops of Oldenburg consist of one regiment of infantry, one of cavalry, and two batteries. It is represented in the German imperial Reichstag by three deputies.—The present territory of Oldenburg proper was originally inhabited by the Chauci, and was afterward overrun by the Saxons. In 1180 the counts of Oldenburg obtained their independence from the dukes of Saxony. In 1448 a son of the late count was elected king of Denmark. The Oldenburg line having become extinct, the country fell to Denmark in 1667. In 1773 Denmark exchanged it for the possessions and claims of the Holstein-Gottorp family in Schleswig-Holstein, and it became an independent state once more. Having been annexed to France at the beginning of 1811, it regained its independence in 1813, and obtained some territorial accessions (including the principality of Birkenfeld) from the congress of Vienna, which also raised the prince to the rank of grand duke. In consequence of the revolution of 1848 the people obtained a liberal constitution, which however was curtailed in 1852. The present grand duke, Augustus (born Nov. 16, 1852), succeeded his father Peter Dec. 12, 1874. On Feb. 16, 1864, the bay and territory of Jade were ceded to Prussia. II. A city, capital of the grand duchy, 24 m. W. N. W. of Bremen, on the Hunte, 11 m. above its confluence with the Weser; pop. in 1871, 14,928. The grand-ducal palace contains many works of German art, and a library numbering about 50,000 volumes. The town has three churches, a synagogue, a gymnasium, a normal school, a theatre, a public library numbering more than 100,000 volumes, and a museum of natural sciences which is especially rich in North German and Indian birds. The most important manufactures are refined sugar, soap, and musical instruments; there are also numerous breweries and distilleries. A brisk trade is carried on in wood, wool, and cattle.

OLDHAM, a N. county of Kentucky, separated from Indiana by the Ohio river; area, about 200 sq. m.; pop. in 1870, 9,027, of whom 2,810

were colored. The surface near the Ohio is hilly; the rest of the county is undulating. The soil is fertile. It is traversed by the Louisville, Cincinnati, and Lexington railroad. The chief productions in 1870 were 52,933 bushels of wheat, 514,745 of Indian corn, 127,650 of oats, 38,322 of potatoes, 301,285 lbs. of tobacco, 25,718 of wool, 124,560 of butter, 40,000 of cheese, and 3,201 tons of hay. There were 3,164 horses, 788 mules and asses, 2,028 milch cows, 4,345 other cattle, 9,226 sheep, and 19,096 swine. Capital, La Grange.

OLDHAM, a market town of Lancashire, England, 6 m. N. E. of Manchester, with which it communicates by railway and canal; pop. in 1871, 82,619. Oldham is in the midst of a rich coal field, and owes its growth, which is comparatively recent, to its manufacturing facilities. It has 66 places of worship, of which 16 belong to the church of England; a blue coat school with an endowment of more than £100,000; a free grammar school, a lyceum, a mechanics' institute, and a subscription library. The principal branch of industry is cotton spinning; there are in the town and vicinity more than 150 mills, mainly for this process. Fustians, velveteens, corduroys, hats, brass and iron castings, rope, and leather are also made.

OLDHAM, John, an English satirical poet, born at Shipton, Gloucestershire, Aug. 9, 1653, died at Holme Pierpoint, Dec. 8, 1683. He graduated at Oxford in 1674, went to London in 1681, and finally devoted himself to poetry and the pleasures of the town. He satirized the Jesuits, and was called the "English Juvenal." A new edition of his works, edited by R. Bell, was published in London in 1854.

OLD MAN OF THE MOUNTAIN. See ASSASSINS.

OLDMIXON, John, an English author, born in 1673, died in London in 1742. After producing several unsuccessful plays, he turned his hand to political writing, and was appointed collector of the customs at the port of Bridge-water. In the interest of the whig party he compiled a "Critical History of England, Ecclesiastical and Civil" (1726), and a "History of England" (1730-'39). These histories have little merit. He superintended the first edition of the collection of English historians which appeared under the name of Bishop Kennett. In his "Prose Essay on Criticism" and "Arts of Logic and Rhetoric," he attacked Pope, who made him conspicuous in the "Dunciad."

OLDTOWN, a town of Penobscot co., Maine, on the W. bank of the Penobscot river, and on the European and North American and the Bangor and Piscataquis railroads, 12 m. N. of Bangor and 70 m. N. E. of Augusta; pop. in 1870, 4,529. It contains four villages, Upper Stillwater, Great Works, Pushaw, and Oldtown. Its principal business is connected with the timber trade. A large boom was placed across the Penobscot some years ago at a cost of \$100,000, to prevent timber from floating out to sea. About 250,000,000 feet of lumber are rafted annually, employing 200 hands.

The principal articles of manufacture are lumber, shingles, carriages, barrels, furniture, and saw-filing machines. One of the saw mills is among the largest in the world. There are Baptist, Congregational, Episcopal, Methodist, Roman Catholic, and Universalist churches. Oldtown was separated from Orono in 1840.

OLEANDER (Fr. *oléandre*, from low Lat. *lorandrum*, a corruption of *rhodendrum*), the name of plants of the genus *nerium*. Though derived from the French, the common name in that language is *laurier-rose* or *laurose* (laurel rose). The genus *nerium* (the ancient name) belongs to the dogbane family (*apocynaceæ*), and consists of shrubs with opposite or whorled, thick and rigid leaves, and clusters of showy flowers in large terminal clusters. The corolla is salver-shaped, with a crown of five slender-toothed scales in its throat; the five stamens have their anthers terminated by a long, twisted, hairy appendage; the two ovaries become in fruit long cylindrical pods containing tufted seeds. There are not more than six or eight admitted species, most of them natives of India; the best known is *N. oleander*, a very old house plant in the northern states, but hardy in the south; it is a native of the Levant as well as of more eastern countries; its large odorous flowers have the appendage to the anthers scarcely protruding; the ordinary color is rose, but the named varieties have white, purple, and variegated, and partly or wholly double flowers. The sweet oleander (*N. odoratum*) has narrower leaves, the appendages to the anthers protruding, and fragrant flowers; this is often confounded with the other by florists; it is more tender, and distinguished by



Oleander (*Nerium oleander*).

the characters here given. As a house plant the oleander is kept indoors during the winter and set outdoors during the summer, where it blooms in July, its flowers remaining a long time. The plant is easily propagated, a very common method being to put the cuttings into

bottles of water, where they form roots in a few weeks and may then be transferred to pots of rich soil. This plant is exceedingly poisonous in all its parts; death has even followed the inadvertent use of the wood for meat skewers, and serious results from the sucking of the



Double Oleander (*Nerium oleander*, fl. pl.).

flowers by children; an infusion of the leaves kills insects, and the bark poisons rats. In Bermuda it has become naturalized and is in common use as a hedge plant. The farmers there say that the oleander poisons the grass growing near the hedges, and that animals are killed by eating it; the fact probably is that the animals eat the fallen oleander leaves with the grass.

OLE BULL. See **BULL**, **OLE BORNEMANN**.

OLEFIANT GAS. See **CARBURETTED HYDROGEN**.

OLEIC ACID, an organic, monatomic acid, found in combination with glycerine in oils and fats, as oleine, or oleate of glycerine. It is obtained by the saponification of oleine, the most fluid constituent of the natural fats and fixed oils. Olive or almond oil is treated with potash, which sets free the glycerine, oleate of potash being formed in the soapy mixture. This soap is treated with tartaric acid, which combining with the potash forms tartrate of potash; and the separated fatty acid, after being washed, is heated for some hours in a water bath with half its weight of oxide of lead. The mixture is then shaken with twice its bulk of ether, which dissolves the oleate of lead and leaves the stearate. After standing some time the mixture is decanted and hydrochloric acid added to it; this unites with the lead and liberates the oleic acid, which dissolves in the ether and rises to the surface of the water, from which it is removed and freed from ether by distillation. Large quantities of crude oleic acid are now obtained in the manufacture of stearine candles, by treating with dilute sulphuric acid the lime soap produced by the action of lime upon tallow. The fatty

acids which are thus liberated, being washed with hot water, solidify on cooling into a mass, which when subjected to pressure yields a liquid rich in oleic acid, but containing considerable stearic acid. After exposure to cold this liquid deposits a quantity of solid matter, and the remaining liquid portion is sent to market under the names of oleic acid and red oil, which may be purified by the processes above described. Oleic acid crystallizes from its alcoholic solution in dazzling white needles, melting at 57° F. to a colorless oil, which at 39° solidifies to a hard, white, crystalline mass, expanding considerably at the same time. Its specific gravity at 66° is 0.898. It vaporizes in a vacuum without decomposition; is insoluble in water, very soluble in alcohol, and dissolves in all proportions in ether. It dissolves the solid fats, and is dissolved by bile, forming a soap. It oxidizes but slowly when solid, but when melted it rapidly absorbs oxygen and becomes strongly rancid. With glycerine it forms three glycerides, monoleine, dioleine, and trioleine. With ammonia and the metallic bases it forms salts called oleates, the oleate of lead being used in purifying the acids. The oleates of the alkalies are always formed in the manufacture of soap.

OLEOMARGARINE, a substance produced from tallow and resembling butter, so called by Mége-Mouriez, according to the idea that, as asserted by Chevreul, butter contains margarine; but this opinion has been generally abandoned. Mége-Mouriez had observed that the milk of cows was not deprived of butter long after they were subjected to extremely scanty feeding; from which he concluded that the fat of the animal was converted into butter. Taking suet, which contains less oleine than butter, he extracted a certain proportion of palmitine and stearine, until the proportion of oleine was sufficient to give it the consistence of butter. Fresh meat cut fine, a small portion of carbonate of soda, and sheep's stomachs, also cut fine, are put into a vessel with water and heated to 113° F.; this causes the fat to separate from the cellular tissue, and being subjected to great pressure it separates into a firm stearine and palmitine, and an oil which on cooling has the consistence of butter. This substance (oleomargarine), while liquid, is combined with about its own volume of a mixture of equal parts of milk and water. Some water, in which cows' udders containing milk glands have been digested, is added, with a little annatto for coloring, and the mixture is churned; on cooling, the fatty matter collects in a manner resembling that when cream is churned to butter. The artificial butter is washed with cold water and salted. (See supplement.)

OLÉRON (anc. *Uliarus*), an island of France, in the bay of Biscay, separated from the mainland by a strait which in its narrowest part is 1 m. wide, and lying opposite the mouth of the Charente, the N. W. point being in lat. 46° 3' N. and lon. 1° 24' W.; greatest length 18 m.,

greatest breadth 7 m.; pop. about 20,000. It belongs to the département of Charente-Inférieure, and has five ports, La Flotte, St. Martin, La Conarde, Loix, and Ars, besides the towns of Château and St. Pierre d'Oléron, the former of which is fortified. Except on the W. side, where it is much exposed, the island is generally fertile, producing grain, vegetables, and wine. Ship building and salt making are carried on. The island was successively the property of the counts of Anjou, the dukes of Aquitaine, the English, and the French.

OLÉRON, Laws of. See LAW MERCHANT.

OLGA, a Russian princess and saint of the Greek church, died in 969. She was the wife of Igor, grand duke of Kiev, the son of Rurik. Her husband fell in battle in 945, and she was regent for ten years during the minority of her son Sviatoslav. She became a Christian, and was baptized at Constantinople in 957 under the name of Helen, though her son remained a pagan. After her death she was canonized in the Greek church. Her festival is July 11 (23).

OLIBANUM. See FRANKINCENSE.

OLIER DE VERNEUIL, Jean Jacques, a French priest, born in Paris, Sept. 20, 1608, died there, April 2, 1657. His father was secretary to Henry IV. Jean Jacques was connected with St. Vincent de Paul, and gave successful missions in Auvergne. Refusing bishoprics, he took charge of the parish of St. Sulpice, Paris, which he reformed; and he founded in 1645 the seminary of St. Sulpice for the better training of the clergy. He had in 1636, with five other gentlemen, formed the society of Montreal to colonize that island, which they purchased in 1640. A new city was soon founded, with convents, hospital, and schools, and the Sulpicians established a theological seminary and college, which still exist. Olier wrote a "Treatise on Holy Orders," "Christian Catechism of the Interior Life," and other works. The best life of him is by Faillon (Paris, 1853).

OLIN, Stephen, an American clergyman, born in Leicester, Vt., March 3, 1797, died in Middletown, Conn., Aug. 16, 1851. He graduated at Middlebury college, Vt., in 1820, and became a teacher in South Carolina. Entering the ministry of the Methodist Episcopal church, he was admitted to the South Carolina conference in 1824, and for two years was stationed in Charleston. In 1827 he was stationed at Athens, Ga., in a supernumerary relation, and in 1829 resumed his itinerant ministry. He was professor of English literature in Franklin college from 1826 to 1832, when he became president of Randolph Macon college. In 1837-'41 he travelled in Europe, Egypt, and Palestine. He was president of the Wesleyan university at Middletown, Conn., from 1842 until his death. He wrote "Travels in Egypt, Arabia Petæa, and the Holy Land" (2 vols. 8vo, New York, 1843), and "Greece and the Golden Horn" (8vo, 1854). His "Works" appeared in 1852 (2 vols. 12mo), and his "Life and Letters" in 1853 (2 vols. 8vo).

OLIPHANT, Carolina, Baroness Nairne, a Scottish poetess, born in the mansion of Gask, Perthshire, July 16, 1766, died there, Oct. 26, 1845. Because of her great beauty she was called in her youth "the flower of Strathearn." Observing the general looseness and ribaldry in the songs of the peasantry, she attempted to write better words for the popular tunes, and the result was a considerable number of songs which were at once recognized as among the finest in the language. The best known of these are "The Land o' the Leal," "Caller Herrin'," and "The Laird o' Cockpen." Her family had been devoted Jacobites, and she wrote several political songs of that character. All of her literary work was anonymous, and her authorship was kept a profound secret until within a few years of her death. After a long engagement, she married in June, 1806, her second cousin, Capt. William Murray Nairne, who by the removal of an attainder in 1824 became fifth Lord Nairne. They resided in Edinburgh. A selection from her songs, with accompaniments by Finlay Dun, was published about 1846, under the title of "Lays from Strathearn." A complete edition of her lyrical compositions was edited, with a life, by the Rev. Charles Rogers (Edinburgh, 1869).

OLIPHANT, Laurence, an English author, born in 1829. He is the only son of Sir Anthony Oliphant, C. B., who was appointed chief justice of Ceylon in 1838. He was educated in England, and at an early age went to Ceylon, where he made the acquaintance of Jung Bahadoor, the Nepalese ambassador to London, who visited Ceylon in 1850 on his way home, and accompanied him to Katmandu, the capital of Nepal. On his return he published "A Journey to Katmandu" (London, 1852). He studied law at the university of Edinburgh, and was admitted to the bar. In the latter part of 1852 he visited Russia, descended the Volga, traversed the country of the Don Cossacks, and spent some time in the Crimea. His second work, "The Russian Shores of the Black Sea" (London, 1853), appearing on the eve of the Crimean war, passed through four editions in a few months. Mr. Oliphant was soon after appointed private secretary to the earl of Elgin, then governor general of Canada, and went to Quebec, where he was made superintendent of Indian affairs. He travelled extensively both in the United States and in Central America, and published "Minnesota, or the Far West" (London, 1855). He also published anonymously at this period a pamphlet entitled "The Coming Campaign," on the best mode of conducting the war with Russia. It was republished under the title of "The Trans-Caucasian Provinces the Proper Field of Operations for a Christian Army." After his return from America he went to Turkey, and as a correspondent of the press accompanied Omer Pasha in a campaign, of which he gave an account in "The Trans-Caucasian Campaign of Omer Pasha" (London,

1856). In 1857, when Lord Elgin was sent as minister plenipotentiary to China, Mr. Oliphant became his private secretary, and on his return published a "Narrative of the Earl of Elgin's Mission to China and Japan" (London, 1860). In 1861, while acting as chargé d'affaires in Japan, he was severely wounded by assassins. He was elected to parliament from the Stirling boroughs in 1865, but resigned in 1868 to join in the attempt at religious and social reformation conducted by Thomas L. Harris, at Portland, Chautauqua co., N. Y., where he now (1875) resides. In 1870 he visited Europe, and was for a time correspondent of the London "Times" in Paris. In 1873-'5 he had charge in the United States and British America of the interests of the direct cable company, an ocean telegraph enterprise. He has also published a novel called "Patriots and Filibusters, or Incidents of Political and Exploratory Travel" (London, 1861), and "Piccadilly" (1870).

OLIPHANT, Margaret (WILSON), an English authoress, born in Liverpool about 1820. Her mother was Scotch, and most of Mrs. Oliphant's tales relate to Scottish life. Her first novel, "Passages in the Life of Mrs. Margaret Maitland of Sunnyside" (1849), was immediately successful, and since then she has published "Merkland" (1851), "Adam Grame of Mossgray" (1852), "Harry Muir" (1853), "Magdalen Hepburn" (1854), "Liliesleaf" (1855), "Zaidee" (1856), "The Life of Edward Irving" (2 vols., 1862), "Chronicles of Carlingford" (1863), "The Perpetual Curate" (1864), "A Son of the Soil" (1865), "Miss Majoribanks" (1866), "The Minister's Wife" (1869), "Historical Sketches of the Reign of George II." (2 vols., 1869), "Three Brothers" (1870), "A Rose in June" (1874), &c.

OLIVA, Alexandre Joseph, a French sculptor, born at Saillagouse, department of Pyrénées-Orientales, about 1824. He was a private in the army when his artistic talent attracted attention, and he went to Paris to study painting under Delestre. At the same time he modelled busts, which became celebrated, the finest being those of the abbé Deguerry (1855), Bishop Gerbet and Father Ventura (1857), François Arago and Richard Cobden for the museum of Versailles, Cherubini (1864), the empress Eugénie (1870), Colbert and St. Vincent de Paul (1872), and Baron Silbert (1874). He has also executed many statues, the most celebrated being that of the abbé Deguerry in the Madeleine (1873), and in 1874 he made one of the prince of Asturias, now king of Spain.

OLIVAREZ, Gasparo de Guzman, count, a Spanish statesman, born in Rome, Jan. 6, 1587, died in Toro, July 22, 1645. His father was ambassador at the papal court of Sixtus V. He studied at the university of Salamanca, and was appointed gentleman of the bedchamber to the prince of Asturias, afterward Philip IV., who in 1621 bestowed upon Olivarez the title of duke of San Lucar, and appointed him min-

ister in place of his uncle the duke of Uceda. Olivarez dismissed some of the best servants of the state to make room for his own creatures, and curtailed government expenses only to obtain the means of gratifying his taste for pomp and splendor. He aimed at reconquering the provinces which Spain had recently lost, and restoring the kingdom to her old supremacy in Europe; but in this attempt he had to encounter the superior skill of the French minister Cardinal Richelieu. Availing himself of the expiration of the truce with Holland concluded in 1609, he reopened hostilities with the Dutch in 1621, but was unsuccessful, and the Spanish colonies were almost ruined. Meanwhile Spain had been obliged to give up the Valtellina. Olivarez, nevertheless, attempted to make her influence felt in Italy and Germany, while he fostered troubles and conspiracies in France; but in these attempts he signally failed. The Spanish troops sent to assist the Austrians against the German Protestants were worsted at nearly every point; and finally the flame of insurrection, fanned by Richelieu's intrigues, broke out within the Spanish dominions. The province of Catalonia rebelled in 1640, and at the same time Portugal threw off the Spanish yoke. Philip's eyes were finally opened, and he dismissed Olivarez in 1643, who was supplanted by his nephew, Don Luiz de Haro. For publishing his defence he was banished to Toro.

OLIVE (Lat. *oliva*), the name of plants of the genus *olea*, and of the fruit of *O. Europæa*. The olive family consists of trees and shrubs without milky juice, distinguished from other monopetalous plants with a free ovary by having two stamens, or always fewer than the divisions of the corolla; it includes the lilac, the privet, and the ash, and several less known plants. The genus *olea* has evergreen leaves and minute white flowers in small racemes or clusters, which are axillary and terminal; the ovary is two-celled and two-ovuled, becoming in fruit a fleshy drupe with a hard two-celled stone, which is often only one-celled and one-seeded; the flesh of the drupe abounds in fixed oil. The common olive (*O. Europæa*) is one of the earliest trees mentioned in antiquity; probably it was a native of Palestine, and perhaps of Greece, and it was introduced to other countries at a very early day; it is largely cultivated in southern Europe, western Asia, and northern Africa; it was brought to South America and Mexico more than 200 years ago, and in various parts of California it was planted at the mission establishments, where some of the old groves still remain, notably that at San Diego, which is still in good bearing, and other plantations have recently been made there. In the Atlantic states the olive was introduced before the revolution, and at several times since; it is perfectly hardy and fruitful in South Carolina; the chief obstacle to its cultivation seems to be the fact that its crop matures just at the time when all

the labor is needed to secure the cotton. The olive tree rarely exceeds 20 ft. in height, has lanceolate or lance-oblong leaves, which are pale green above and whitish beneath, and axillary



Common Olive (*Olea Europaea*).

clusters of flowers; from the dull color of the leaves, an olive grove presents a sombre aspect. The French enumerate over 20 varieties, differing in the size and color of their leaves and fruits. The tree is propagated by various methods; seedlings are raised upon which to graft the choicer kinds, or these are multiplied by cuttings of the stems and roots, by suckers, by layers, and by protuberances; the trunks of old trees present numerous swellings or nodules containing undeveloped buds, which are removed and planted like bulbs. The tree is of slow growth, and does not come into bearing until about seven years old; but it continues indefinitely, and there are trees now standing which are supposed to have been in existence before the commencement of the present era. In France the trees are regularly pruned to keep the heads low, in order to facilitate the gathering of the fruit. The wood of the olive is yellowish and very fine-grained, and, especially that of the root, often beautifully feathered and clouded; hence it is valued for small cabinet and inlaid work.—The products of the tree are the fruit and its oil. The fruit is too bitter to be eaten unless pickled, and in the olive-growing countries large quantities are prepared for home use and for export, and some kinds are cultivated especially for their superior fruit; the different varieties give fruits varying in size from an acorn to a large plum. The fruit is gathered when it has attained its full size, but while still green, and placed in a strong ley of wood ashes or a solution of potash; when the potash has penetrated to the stone, which is manifested by a change of color, the olives are placed in water, which is renewed several times a day for five days;

a saturated brine is prepared of the purest salt, to which are added coriander, cloves, cinnamon, and such aromatics as are desired, and boiled a few minutes and strained; this when cold is mixed with an equal quantity of water and poured over the olives placed in jars or bottles, which are then sealed. Thus prepared, olives are a condiment rather than an article of food, and are much eaten at lunches; they are thought to improve the flavor of wine as well as to excite an appetite for it; they are sometimes used in salads and to flavor made dishes. Olive oil is obtained from the ripe fruit, which when it has reached that state is of a dark purple color; the thoroughly ripe olives yield a larger quantity of oil, but not of so fine a quality as oil from those that have just begun to ripen; the pulp of the fully ripe fruit contains nearly 70 per cent. of oil. Those who make the finer kinds of oil gather the fruit by hand as soon as it begins to color, and spread it under sheds, where it is frequently turned and loses the greater part of its contained moisture; but for common oil the fruit is allowed to lie beneath the trees until it is convenient to gather it, which is sometimes all winter. The process of extracting the oil is essentially the same in different countries. The fruit is crushed to a pulp in a mill, and placed in coarse sacks, which are stacked one upon another and subjected to pressure; the oil flows into a cistern containing water, from the surface of which it is dipped; this first pressing is called virgin oil; a second quality is obtained by mixing the contents of the bags with boiling water, replacing them, and submitting them to greater pressure than before. If the fruit is left in heaps until it ferments, it yields a greater quantity of oil, but of very poor quality. Oil of the finest quality has a slightly greenish color, a faint but agreeable odor, and a bland taste, leaving a slight sense of acidity in the throat. When it is cooled to nearly the freezing point of water, a solid fat is deposited. If allowed to congeal perfectly, and then subjected to pressure, about one third of fluid oil is separated, which is oleine and does not congeal at 25° or 20° F. The solid part consists of palmitine and similar principles. Olive oil is one of the oils not changed by the action of the air into a resinous substance, and is classed as a non-drying oil. It is sometimes adulterated by the admixture of cheaper oils, and unless the foreign oil be present in considerable amount it is very difficult to detect it; the greater specific gravity of the cheaper oils, as indicated by the elaiometer, is one of the tests; the chamber of commerce of Nice has recently offered a reward of 15,000 francs for a simple method of detecting adulterations. The production of oil in Italy is estimated at 33,000,000 gallons annually, while that of France is only about 7,000,000. Not many years ago oil was imported almost exclusively in thin, round-bottomed flasks, covered with rush-work, stopped with cotton, and tied over

with bladder; these packages are now rarely seen, but the finer kinds are imported in bottles of various styles; commoner kinds come in jars and casks. The imports into the United States during the year ending June 30, 1873, were 340,037 gallons, valued at \$445,774. In countries where it is produced olive oil is largely used as food, replacing butter, not only with bread, but in cooking, especially for frying; like other fixed oils, it is very nutritious, but it is not readily digested by weak stomachs. In this country, where it is frequently called sweet oil, its use as food is limited almost entirely to the dressing of salads. In medicine it is sometimes used as a mild laxative in doses of one to two fluid ounces; in cases of poisoning by corrosive substances, it is given with a view to its mechanical effect in shielding the stomach from their action; but its chief medical use is in the preparation of liniments, ointments, and plasters. In the arts the oil is used as a lubricant, and the oleine separated by cold, as already described, makes the finest watch oil. The cheaper kinds were formerly somewhat used for burning, but have been superseded by the mineral oils. Much of the oil is consumed where it is produced in the manufacture of soap, it being the basis of the well known Castile, Marseilles, and Venetian soaps. (See SOAP.) A resinous exudation is sometimes found upon the tree, which has been called olive gum and Lecca gum, and was formerly used in medicine as a stimulant; and the bark has been employed as a tonic.—The American olive (*O. Americana*), also called devilwood on account of the difficulty of cutting and splitting it, is a small tree found from Virginia to Florida; it has a whitish bark, and entire very smooth, evergreen leaves, 3 to 6 in. long; small, white, fragrant, polygamous flowers; and a spherical black fruit twice the size of a pea, with an oily flesh. According to Michaux, the inner bark on exposure to the air turns instantly to a bright red, and the wood becomes reddish by exposure. According to Decaisne and Naudin, the fruit of this is sometimes pickled. *Olea fragrans* of the greenhouse, placed by some in the genus *osmanthus*, is an evergreen shrub from China and Japan; it has oblong or oval, finely serrate, dark green leaves, and numerous clusters of small white flowers, which have the most exquisite and delicate fragrance. The flowers are said to be used by the Chinese to scent the finer kinds of tea. It is a favorite greenhouse plant, as it blooms when only about 6 in. high; and in the southern states, where it is hardy, it makes a handsome bush 6 to 8 ft. high, and is a general favorite. Another related species is *O. ilicifolia* (or *osmanthus*), the holly-leaved olive, from Japan; it is a fine compact shrub, with dark green leaves like those of the holly; a variety with white-edged leaves is exceedingly beautiful. These are hardy in England, but in the United States their northern limit is yet undetermined.

OLIVER. I. Andrew, lieutenant governor of Massachusetts, born in Boston, March 28, 1706, died there, March 3, 1774. He graduated at Harvard college in 1724, and became a member of the general court, and afterward of the council. When the stamp act was passed by the English parliament, he accepted the office of distributor of stamps, and on Aug. 14, 1765, was hanged in effigy from the "liberty tree." He appeared the next day before the people under the liberty tree, and publicly resigned his office. He was secretary of the province from 1756 to 1770, and in 1771 was appointed lieutenant governor. With Gov. Hutchinson, his brother-in-law, he promoted as much as was in his power the designs of the British ministry, as was proved by his letters, which were obtained by Franklin in England, and sent back to America in 1772. When therefore the general court petitioned the king for the removal of Hutchinson, they included Oliver's name also.—His son **ANDREW** (1731-'99), a judge of Essex co., Mass., before the revolution, was one of the founders of the American academy of arts and sciences. **II. Peter**, chief justice of Massachusetts, brother of the preceding, born March 26, 1713, died in Birmingham, England, Oct. 13, 1791. He graduated at Harvard college in 1730, afterward filled several stations in Plymouth co., and on Sept. 14, 1756, was raised to the bench, although not a lawyer, and in 1771 made chief justice. In March, 1774, the house of representatives, voting the judges of the superior court sufficient salaries from the colonial treasury, ordered them to refuse any gifts from the king. Four of them complied, but Oliver refusing, the house impeached him, and suspended him from his functions till the conclusion of his trial. He sided openly with the tories; and when the British troops evacuated Boston, he went with them, and finally removed to England, where a pension was given him by the crown. He was an enthusiastic antiquary, transcribing with his own hand the manuscript history of William Hubbard, and carrying away with him when he left America records and papers which he had collected concerning the early settlement of Plymouth colony. He published, besides some pamphlets, a "Scriptural Lexicon" (Birmingham, 1784-'5; new ed. by the Rev. H. C. Cotton, Oxford, 1832).

OLIVES, Mount of, or Mount Olivet (Arab. *Jebel et-Tur*), a mountain of Palestine celebrated in Biblical history. It is a few hundred yards E. of Jerusalem, separated from it by the valley of Jehoshaphat, through which flows the brook Kedron. It is a ridge rather than a single hill, having three summits. The centre, a little rounded top on which stands the village of Tur, is 2,643 ft. above the sea and 384 ft. above the valley; and being higher than the most elevated part of Jerusalem, it is before one's eyes from nearly all the streets, and affords the most favorable view of the city. The sides are partly cultivated in terraces, streaked here

and there with bare rock, and dotted with the olive trees from which the mountain takes its name. From this central summit, according to a very old tradition, the ascension of Jesus took place; and a church was built here by the empress Helena on the site of one now occu-

pied by the Armenians. The garden of Gethsemane lies on the declivity near the foot of the hill. The central summit is apparently the highest, but, according to the latest and most accurate surveys, the northern exceeds it by about 20 ft. Toward the north the ridge



Mount of Olives.

sweeps around to the west and spreads out into the high level tract of the city. On the south it sinks down into a lower ridge over against the "well of Nehemiah," now called by the Franks the "Mount of Offence," in allusion to the idolatrous worship established by Solomon "in the hill that is before Jerusalem." From this summit the Dead sea may be seen. On the east the mount of Olives overlooks the "wilderness of Judah," which stretches over a succession of desolate hills for 10 m., and is then bounded by the valley of the Jordan. The road to Bethany passes over Mt. Olivet. The Saviour used to sit here with his disciples, and retire hither alone to rest and pray. Here he delivered some of his parables, and passed the last night before he was seized and delivered up to Pontius Pilate.

OLIVIER, Guillaume Antoine, a French entomologist, born at Les Arcs, near Toulon, Jan. 19, 1756, died in Lyons, Oct. 1, 1814. He graduated M. D. at Montpellier, and afterward gave his attention exclusively to the natural sciences. In 1792 he and Bruguières were sent by government on a scientific mission to Persia, returning in 1798; and Olivier published *Voyage dans l'empire ottoman, l'Égypte et la Perse* (6 vols. 8vo, Paris, 1801-'7). His *Histoire naturelle des coléoptères*, of which the first part appeared in 1789, was brought to a conclusion in 1808, in 6 vols. 4to, with 363 plates. His *Dictionnaire de l'histoire naturelle des insectes, papillons, crustacées, &c.* (7 vols. 4to, 1789-1825), was completed after his death.

OLIVIER, Juste Daniel, a Swiss poet, born at Eysins, Vaud, Oct. 18, 1807. He studied at Lausanne, where he gained a prize in 1825 for his poem *Marcos Botzaris*. He was professor of history and literature at Neuchâtel and Lausanne till 1842, when through political complications he settled in Paris. His works comprise five volumes of poetry (1830-'35), and his *Chansons lointaines* (Paris, 1847; new ed., 1854) are his finest productions. Among his prose writings are: *Le canton de Vaud* (2 vols., Lausanne, 1837-'41), *Études d'histoire nationale* (1842), *Mouvement intellectuel de la Suisse* (Paris, 1847), and several novels.

OLIVIER, Théodore, a French mathematician, born in Lyons before 1800, died there in 1853. He was educated at the polytechnic school in Paris, and became a teacher there. In 1830 he was appointed professor of descriptive geometry in the *conservatoire des arts et métiers*. His principal works are: *Théorie géométrique des engrenages* (Paris, 1842); *Développements de géométrie descriptive* (1843); *Cours de géométrie descriptive* (3 vols. 4to, 1845; 2d ed., 2 vols. 4to, 1855); *Compléments de géométrie descriptive* (1845); and *Mémoires de géométrie descriptive* (1851). He is ranked as one of the ablest writers on descriptive geometry and its applications.

OLLA PODRIDA (Span., putrid mess), a Spanish national dish, consisting of several kinds of meat cut up into small pieces, and stewed with a variety of vegetables. The dish is a great favorite with the poor, and is kept so long that

its odor and flavor become highly offensive. It is used, like *pot pourri*, to denote a medley.

OLLIVANT, Alfred. See supplement.

OLLIVIER, Émile, a French politician, born in Marseilles, July 2, 1825. He is the son of Démosthène Ollivier, who was a member of the constituent assembly in 1848, and was in exile from Dec. 2, 1851, to 1860, on account of his opposition to the second empire. Émile was beginning to practise law in Paris at the outbreak of the revolution of 1848, when Ledru-Rollin appointed him commissary general at Marseilles, and he repressed the disorders in that city. Cavaignac made him prefect there, but he was subsequently transferred to the much less important department of Haute-Marne. He resumed practice as an advocate at Paris in 1849. In 1857 he was returned to the legislative body as an opposition member for Paris, and was reelected in 1863. Early in 1867 he deserted his former political friends, declaring himself a liberal Bonapartist; he was consequently defeated at the general election in Paris in 1869, but was returned for the department of Var. In December of the same year he was chosen by Napoleon to preside as minister of justice over the administration formed according to the new constitutional programme of the empire, and his official career began on Jan. 2, 1870. He incurred odium by his subserviency to the emperor, and by declaring (July 15), in reply to the opposition of Thiers to the projected war against Germany, that his administration assumed the responsibility of it "with a light heart;" and he was often ridiculed on account of his pompous pretensions to statesmanship and eloquence. He was obliged to resign on Aug. 9, after the first reverses of the French, being succeeded by Palikao, and retired to the village of Pallone in northern Italy. Owing to his official position, he had been elected to the academy, April 7, 1870, as successor of Lamartine. In February, 1874, he returned to Paris to read to a committee his opening speech, in which he extolled the fallen emperor and disparaged his opponents. Guizot rebuked his language, and he was not allowed to take his seat in the academy; but after the death of Guizot in September, he was not only admitted but actually made chancellor of the academy. His first wife, a daughter of Liszt the pianist, died in 1862.

OLMSTED, a S. E. county of Minnesota, drained by the Zumbro and Root rivers and other streams; area, 720 sq. m.; pop. in 1870, 19,793. The surface is uneven and the soil productive. It is traversed by the Winona and St. Peter railroad. The chief productions in 1870 were 2,117,074 bushels of wheat, 340,223 of Indian corn, 996,364 of oats, 114,056 of barley, 126,668 of potatoes, 18,082 lbs. of wool, 20,700 of hops, 654,455 of butter, and 31,319 tons of hay. There were 7,576 horses, 6,496 milch cows, 9,463 other cattle, 4,918 sheep, and 7,298 swine; 2 manufactories of boots and shoes, 6 of carriages and wagons,

3 of cooperage, 1 of iron castings, 1 of curried leather, 1 of engines and boilers, 5 of saddlery and harness, 1 of sash and blinds, 3 of tin, copper, and sheet-iron ware, 3 breweries, 3 flour mills, and 3 saw mills. Capital, Rochester.

OLMSTED, Denison, an American natural philosopher, born in East Hartford, Conn., June 18, 1791, died in New Haven, May 13, 1859. He graduated at Yale college in 1809, and almost immediately took charge of the union school at New London. In 1815 he became a tutor in Yale college, and in 1817 was appointed professor of chemistry, mineralogy, and geology in the university of North Carolina. Here he proposed and executed the first state geological survey ever attempted in this country, the report of which was published in 1824 and 1825. In the latter year he was appointed professor of mathematics and natural philosophy in Yale college; in 1836 the professorship was divided at his request, and he retained the department of natural philosophy. Between 1831 and 1843 he published several text books on natural philosophy and astronomy, which were widely used. As early as 1830 he had published an elaborate theory of hail storms, which called forth much discussion, but finally received the general approbation of meteorologists. After the shower of shooting stars which fell in November, 1833, he investigated their history and phenomena for many years, till he had demonstrated their cosmical origin. He made a series of observations on the aurora borealis, the results of which are given in vol. viii. of the "Smithsonian Contributions to Knowledge." He made numerous mechanical inventions, very few of which were secured by patent. One was the Olmsted stove.

OLMSTED, Frederick Law, an American landscape gardener, born in Hartford, Conn., April 26, 1822. He studied engineering and agricultural science at Yale college, and subsequently followed farming and horticulture as a business. In 1850 he made a pedestrian journey through Great Britain and portions of the continent, some of the results of which were embodied in "Walks and Talks of an American Farmer in England" (New York, 1852). In 1852-'3 he travelled in the southern and southwestern states, examining the slave system of labor from the economical point of view, after which he published "A Journey in the Seaboard Slave States" (New York, 1856), "A Journey through Texas" (1857), and "A Journey in the Back Country" (1860). A *résumé* of these works was issued in London under the title of "The Cotton Kingdom" (2 vols., 1861). In 1855 he made another tour through France, Italy, and Germany, during which he paid especial attention to parks and rural arts. In 1857 premiums were offered for the best plans for laying out the Central park of New York, and of 34 designs sent in the highest prize was awarded to that prepared by Mr. Olmsted in conjunction with Mr. Calvert Vaux. Mr. Olmsted was engaged during

the next four years in managing the construction of the park upon this design. In 1859 he again visited Europe and examined various public works. On the breaking out of the civil war he was appointed by President Lincoln a member of the commission of inquiry and advice in regard to the sanitary condition of the United States forces, and during the next three years resided in Washington as the business manager of that organization. Subsequently he spent two years in California, and while there was a commissioner of the national park of the Yosemite. Returning to New York, he was engaged in 1866 with Mr. Vaux to lay out and superintend the Brooklyn park, and has since been employed in designing parks and public works in New York, Washington, Chicago, Buffalo, Montreal, and other places.

OLMÜTZ (Slav. *Holomauk*), a town of Austria, formerly the capital of Moravia, now one of the principal fortresses of the empire, situated on an island of the March or Morawa, 103 m. N. N. E. of Vienna; pop. in 1870, excluding the garrison, 15,231. It is well built, and contains several suburbs, fine squares and promenades, and numerous institutions of learning or benevolence. There are woollen manufactures, and the trade in cattle is promoted by annual fairs. The railway which connects the great Vienna and Breslau and Vienna and Prague lines passes by the town, and another line connects it with Brünn. The cathedral, the churches of St. Maurice and St. Michael, the archbishop's residence, the town house with a famous clock, and a theatre, are noteworthy. The university of Olmütz was founded in 1581, removed to Brünn in 1778, restored in 1827, and abolished in 1853.—Olmütz is traced to the times of the Roman empire. It withstood an assault of the Mongols in 1241, and a siege of Béla IV. of Hungary in 1253; joined the revolt against Ferdinand II. at the beginning of the thirty years' war; was taken by the Swedes under Torstenson in 1642, and retaken by the imperialists; was taken by the Prussians in the first war of the Austrian succession, but besieged by them in vain during the seven years' war. Among the prisoners of state who have been confined in the dungeon of Olmütz was Gen. Lafayette. Since the war with Prussia in 1866 the fortifications of the city have been greatly strengthened, and a new park has been laid out.

OLONETZ, a N. W. government of Russia, bordering on the governments of Archangel, Vologda, Novgorod, and St. Petersburg, and on Lake Ladoga and Finland; area (exclusive of lakes), 50,495 sq. m.; pop. in 1867, 302,490, mostly Russians, Finns, and Lapps. The surface is in great part covered by forests, marshes, and lakes. Of the latter, besides Lake Ladoga on the border, the largest are Lakes Onega and Vyg. The principal rivers are the Onega, which flows through Archangel into Onega bay, an inlet of the White sea; the Svir, which connects Lakes Onega and Ladoga; and

the Vodla, which flows from Lake Vodlo into Lake Onega. The winters are very long, and the short summers excessively hot. Agriculture is much neglected; hemp and flax are among the principal articles raised. Fishing and hunting are leading occupations of the inhabitants. Pasturage is scarce, and grazing neglected. Some copper, and iron sufficient to supply ten blast furnaces, are mined, and large quantities of porphyry and marble are quarried. The principal towns are Petrozavodsk, the capital, on the W. shore of Lake Onega, with about 11,000 inhabitants; Olonetz, the former capital, a small town near the E. shore of Lake Ladoga; Vytegra, on a river of the same name; and Kargopol, on the Onega.

OLSHAUSEN, Hermann, a German theologian, born at Oldeslohe, Holstein, Aug. 21, 1796, died in Erlangen, Sept. 4, 1839. He studied theology at Kiel and Berlin, and in 1818 became private tutor in the latter place, in 1821 extraordinary professor in Königsberg, and in 1827 ordinary professor of theology. He was ordinary professor at Erlangen from 1834 till his death. He devoted his attention chiefly to the exegesis of the New Testament. His *Biblischer Commentar über sämtliche Schriften des Neuen Testaments* (vols. i.-iv., 1830-40; vols. v.-viii., by Ebrard and Wiesinger, 1850-'53), the most celebrated of his works, was translated into English for Clark's "Foreign and Theological Library;" and an American reprint, revised after the fourth German edition by Prof. A. C. Kendrick of Rochester university, was published in 1856-'8 ("Biblical Commentary on the New Testament," 6 vols. 8vo, New York).

OLYMPIA, a city, capital of Washington territory, and of Thurston co., situated at the head of Budd's inlet, the southern projection of Puget sound, 645 m. N. of San Francisco, 105 m. N. by W. of Portland, Oregon, and 95 m. S. S. E. of Victoria, Vancouver island, in lat. 47° 3' N., lon. 122° 57' W.; pop. in 1870, 1,203; in 1875, about 1,500. It is connected with Tumwater on the west by a bridge 520 ft. long across the mouth of the Des Chutes river, and a bridge 2,030 ft. long extends to the W. shore of the inlet. At Tumwater the Des Chutes by a succession of falls descends 85 ft. within a distance of 300 yards, affording abundant water power. Olympia is 15 m. N. of Tenino on the Pacific division of the Northern Pacific railroad, which affords communication with the valley of the Columbia river. The back country is heavily wooded, and the scenery, with the sound in front, the Cascade mountains on the right, and the Coast mountains on the left, is grand. The streets are broad and regular, and shaded with rows of maples and elms. The residences are handsome and surrounded with gardens. The public buildings are the capitol, a two-story wooden structure, a fine city hall, and a court house and jail. Large vessels can reach the wharf at high tide, but at low water a mud flat extending 1½ m. into the

inlet prevents the approach even of small boats. The mean rise and fall of tides is 9.2 ft., and the difference between the highest and lowest tides is 24 ft. Two semi-weekly lines of steamers run to Victoria and intermediate points, and a daily line of stages connects with the railroad at Tenino. There are a soap factory, two boot and shoe factories, and a saw mill. The city has several stores, a private banking company, three hotels, two public and three private schools, and five weekly newspapers. The territorial and good templars' libraries have each more than 6,000 volumes. There are six churches: Baptist, Congregational, Episcopal, Methodist, Presbyterian, and Roman Catholic.—The first white settlement was made at Olympia in 1846. It was laid out as a town in 1851, and incorporated as a city in 1859.

OLYMPIA, a plain of Elis in ancient Greece, on the right bank of the Alpheus, about a third of a mile from the town of Pisa. It was the scene of the Olympic games, and was also famous for its sacred grove, where stood the great temple of Jupiter Olympius, founded by the Eleans in 512 B. C., and containing the colossal gold and ivory statue of the god, the masterpiece of Phidias. The grove (which was surrounded by a wall) and its immediate neighborhood contained numerous other temples and public buildings, collectively, like the plain, called Olympia.

OLYMPIAD. See CHRONOLOGY, vol. iv., p. 557.

OLYMPIAS, daughter of Neoptolemus I., king of Epirus, wife of Philip of Macedon, and mother of Alexander the Great. Her imperious and jealous nature and the infidelity of Philip caused strife between them; and on the marriage of Philip with Cleopatra, the niece of Attalus, in 337 B. C., she fled to the court of her brother Alexander, king of Epirus, whom she incited to make war upon Macedon. On the death of Philip, whose assassination she approved, she returned to Macedon, and put to death her rival Cleopatra and her infant daughter. She was constantly at feud with Antipater, the regent during the expeditions of Alexander; and when in 323 he was placed in absolute control of affairs, Olympias withdrew to Epirus. On the death of Antipater in 319, the new regent Polysperchon sent for her to return to Macedon, but she determined to remain in Epirus until the war should be terminated. In 317 she took the field in person, together with Polysperchon, against Arrhidæus and Eurydice, whom she defeated and put to death. She also put to death Nicenor, brother of Cassander, and 100 of his followers. She was at last defeated and captured by Cassander at Pydna in the spring of 316, and soon after executed.

OLYMPIC GAMES, the most ancient and famous of the four great national festivals of the Greeks, celebrated once in four years at Olympia. Their origin, like that of the other Hellenic games, was probably connected with the rites paid to some deity, and they gradually ex-

panded into a festival partly religious and partly secular. After being discontinued for a considerable period, the Olympic games were re-established in the 9th century B. C. by Iphitus, king of Elis, and Lyeurgus, who were commanded by the Delphic oracle to revive the festival as a remedy for intestine commotions and for pestilence with which Greece was then afflicted. For more than a century after this the games continued a local festival, frequented chiefly by the neighboring Peloponnesians; but as they grew in importance, spectators came from the more distant states and from the Greek colonies of Asia, Africa, and Europe. Except in two or three instances, the management of the games was in the hands of the Eleans, who appointed certain of their citizens to preside as judges. As the time approached for the celebration of the games, a sacred truce was proclaimed, and during the month in which they took place any armed invasion of the Elean territory was esteemed sacrilege. At the same time hostilities were suspended throughout Greece. At first the festival was confined to a single day, and consisted of the simple match of runners in the stadium, which was about 600 feet long. In 776 B. C. the Eleans inscribed the name of their countryman Corebus as victor in the competition of runners, and for nearly 1,000 years afterward we have regular lists of the victors in the foot races, to which in later times the names of those successful in other games were added. This date was subsequently employed by the Greeks as a chronological era, and the Olympiads, as the periods between two celebrations were called, commencing with the year 776 B. C., from which the first is reckoned, have supplied one of the oldest records of continuous time. In the course of time the festival was varied by additional contests, and from the beginning of the 77th Olympiad (472) its duration was extended from one to five days. In the 14th Olympiad (724) the double stadium for runners was introduced, and in the 15th the long course, in which the stadium was traversed a number of times. In the 18th Olympiad (708) wrestling matches were added, and also the complicated *πένταθλον*, which included leaping, running, throwing the quoit, throwing the javelin, and wrestling. To gain a victory in the latter contest the competitor was obliged to conquer in each of its five parts. In the 23d Olympiad (688) boxing was introduced, and in the 33d (648) the *παγκράτιον*, which consisted of boxing and wrestling combined, the cestus, or leather thong about the hands and arms, being allowed in the first contest but not in the second. In both games the combatants fought naked. The race with four-horse chariots, for which a special course called the *ἱππόδρομος*, about 2,400 ft. in circuit, was set apart, was introduced in the 25th Olympiad (680), and became one of the most popular and celebrated of all the matches; the chariots were obliged to make the circuit 12 times, a distance of over 5 m. In ad-

dition to these there were foot races in which the runners wore heavy armor, several kinds of races on horseback, races between chariots drawn by two horses or by mules, wrestling and running matches between boys, and other athletic contests, some of which were speedily abolished. Like all the great national festivals of Greece, the Olympic games included no combats with any kind of weapons. The games were open to persons of all ranks and occupations, the only conditions being that they should prove a pure Hellenic descent and a good moral character. After the conquest of Greece by the Romans the latter were allowed to become competitors. In all cases the combatants were obliged to undergo a preparatory training, and to take a solemn oath to contend fairly. Any attempt to bribe a competitor to give the victory to his antagonist was punished by a heavy fine. In the earlier celebrations, as in the Homeric games, the prizes seem to have had some intrinsic value; but after the 7th Olympiad, in which Daicles the Messenian received for his victory in the stadium a wreath from the sacred olive tree near Olympia, this simple reward, with the honor of being proclaimed victor, was considered sufficient. The victor thenceforth became a marked man in his state, upon which as well as upon his family he was considered to have conferred everlasting glory; ovations and many substantial honors awaited him on his return home; his praises were sung by the most eminent poets; and his statue was often erected at the expense of his fellow citizens in the Altis, or sacred grove of Jupiter at Olympia. No women were allowed to be present at the celebration of the games, under penalty of death, a single exception being made in the case of the priestess of Demeter Chamyne, to whom a seat was assigned opposite the judges; but women were allowed to enter chariots for the races, and frequently did so. Many literary works were here first publicly recited, although such recitations were not contests and formed no part of the festival proper; and painters and sculptors found abundant means to dispose of their productions. Many persons were also present as deputies from the various states and colonies, and by the number of their offerings and the splendor of their retinues greatly added to the reputation of the festival. The Olympic games preserved their crowds of visitors and their celebrity for many centuries after the extinction of Greek freedom, but were finally abolished by a decree of the Christian emperor Theodosius, A. D. 394.

OLYMPUS, Mount, a lofty group of mountains in Turkey, partly in Macedonia and partly in Thessaly. Its S. extremity is at the mouth of the river Peneus, on the shore of the Thermaic gulf, and is separated by the vale of Tempe from the neighboring heights of Ossa, both mountains forming the E. extremity of the Cambunian range. Its highest peak has an elevation of 9,754 ft. The slopes in many

places are richly clothed with forests, but toward the summit, which is broad and covered with snow for the greater part of the year, the ridge is broken into vast rugged precipices, indented with deep ravines. In Greek mythology Mount Olympus was the residence of Jupiter and the chief celestial deities, and the clouds which veiled its summit were supposed to conceal the entrance to the vault of heaven.—In Mysia, Lycia, Cyprus, and elsewhere, were mountains called by this name, which is also borne by an eminence bordering on the plain of Olympia in Elis.

OLYNTIUS (now *Aio Mamas*), an ancient town of Macedonia, in Chalcidice, at the head of the Toronaic gulf. It was early inhabited by Greeks, was taken by the Persians under Artabazus, was next subject to Athens, and regained its independence when the Spartan general Brasidas extinguished the Athenian power in Chalcidice (424 B. C.). From its excellent maritime position, it grew in wealth and importance, until, when it had become too powerful, the Spartans captured it in 379. In 352 the Olynthians formed an alliance with the Athenians, and in 347 the city was betrayed to Philip of Macedon, the citizens were sold, and every building was demolished.

OMAHA, the largest city of Nebraska, capital of Douglas co., on the Missouri river, opposite Council Bluffs, Ia., 50 m. N. E. of Lincoln, and 490 m. by rail W. by S. of Chicago; pop. in 1860, 1,883; in 1870, 16,083, of whom 6,320 were foreigners; in 1875, about 20,000. It occupies a beautiful plateau, rising gradually into bluffs. The streets are broad and cross each other at right angles. The city is lighted with gas, and is well provided with street railroads. The level portion is chiefly devoted to business purposes, while the bluffs are occupied by handsome residences with tastefully arranged grounds. The United States court house and post office is a fine building of Cincinnati freestone, 122 by 66 ft., and four stories high, costing \$350,000. The high school building, the Grand Central hotel, and the depot and general office of the Union Pacific railroad are also noteworthy structures. Omaha is the E. terminus of the Union Pacific railroad, and also of the Omaha and Northwestern and the Omaha and Southwestern lines. By bridge and ferry to Council Bluffs it is connected with the eastern railroad system. (See COUNCIL BLUFFS.) There is considerable trade, the wholesale business in groceries, dry goods, hardware, crockery, lumber, and agricultural implements amounting to about \$9,500,000 a year. The city has two national banks, a state bank, and a private bank, with a total capital of \$600,000, and deposits to the amount of \$2,700,000. Manufactures are increasing. The principal establishments are extensive smelting works, smelting and refining gold, silver, lead, and zinc; large linseed oil works, steam engine works, a cracker factory, two soap factories, and several large breweries and distilleries, besides the

repair and construction shops of the Union Pacific railroad. There is also a pork-packing establishment. The public schools are graded and of a high character; the average attendance is about 1,500 pupils. The city is the seat of the state institution for the deaf and dumb, and the United States courts for the district of Nebraska are held here. Three daily and six weekly newspapers and three monthly periodicals are published. There are 24 churches.—Omaha was laid out in 1854, and became the territorial capital. It was incorporated as a city in 1857. Its rapid growth dates from the construction of the Union Pacific railroad.

OMAHAS, a tribe of American Indians of the Dakota family. Marquette represented them on his map in 1673, and about 1766 Carver found them on the St. Peter's. They formed two tribes, the Hongashano and the Ishtasunda or Gray Eyes, divided into 13 clans, one of which preserved a sacred shell in a rude temple constantly guarded. They cultivated corn, beans, and melons. Among their customs was one prohibiting a man from speaking to his father-in-law or mother-in-law. About 1800 they made a lasting peace with the Pawnees and Poncas. In 1802, from a tribe able to send out 700 warriors, they were reduced by small-pox to 300; they then burned their village, and became wanderers. The Sioux pursued them relentlessly then as now. In 1805 Lewis and Clarke found them on the Quicoure, numbering 600. Treaties were made on July 20, 1815; Sept. 23, 1820, ceding lands at Council Bluffs; Oct. 6, 1825; and July 15, 1830, ceding lands for an annuity, a blacksmith, and agricultural implements. The Sioux frequently drove them to the Elkhorn, but in 1843 they returned to their village and made peace with some Sioux bands. A mission begun in 1839 failed, and one established in 1846 has had but little success. By a treaty of March 16, 1854, more of their lands were ceded. Their great chief, Logan Fontanelle, was killed by the Sioux in 1855. Since then they have devoted themselves exclusively to agriculture, and their condition has rapidly improved. In 1873 they numbered 1,001, and had a good church and three schools. Their property was estimated at \$75,000, and their reservation contained 345,000 acres, in the N. E. part of Nebraska, between the Elkhorn and the Missouri.

OMAN, a country of S. E. Arabia, comprising the coast from Abu Debi, on the Persian gulf, lon. 54° 40' E., to the vicinity of Merbat on the Indian ocean; area, about 80,000 sq. m.; pop. estimated in 1873 at 1,598,000. Its boundary inland is limited only by the great desert. It has also a nominal jurisdiction over the coast of the Persian gulf from Abu Debi to the bounds of Nedjed, including Bahrein and the other islands of the gulf eastward, the Persian coast opposite Ras Musandum from Ras Jashk to Bunder Abbas, and the islands of the Indian ocean, including Socotra. The peninsula which constitutes Oman proper, ex-

tending from Ras el-Hadd to Ras Musandum, is about 350 m. long. The coast line between these two points is nearly a crescent. A range of mountains, following generally the same curve, traverses the country from its S. E. to its N. extremity, throwing off in its course a branch which extends to Ras el-Khaimah on the Persian gulf. The average height of these mountains is about 4,000 ft., but in their highest ridge, called Jebel Akhdar, they reach an elevation of 6,000 ft. Limestone is the prevailing rock, but near Muscat, where the cliffs rise abruptly from the coast, serpentine predominates; and at the N. extremity of the chain, around Ras Musandum, are steep walls of basalt or trachyte, which show many evidences of volcanic action. In the neighborhood of Ras el-Hadd are rich lead mines, and copper mines are worked in the interior. Iron is found in many localities, and gold is said to exist in Jebel Akhdar. Rock salt is abundant, and is worked largely for exportation. The principal mines are on the island of Ormuz and near Bunder Abbas on the Persian coast. The sea throws up amber in considerable quantities, and pearls are found in the Persian gulf. Only one pearl fishery is now carried on, at the island of Ormuz. Gold, pearls, amber, and salt are government monopolies. The soil of Oman near the sea is poor, but in the interior it is very fertile when irrigated. There are a few streams, which are generally dependent on the rains, but several are said to be permanent. Rain is abundant from October to March in the highlands, whence torrents descend to the plains. Irrigation is practised extensively, the water being collected and led through the cultivated tracts in subterranean canals, which extend sometimes many miles. Wheat, maize, barley, durra, and other grains grow in abundance; and cotton, sugar, tobacco, indigo, and coffee are raised to some extent. The coffee is inferior to that of Yemen, and the sugar cane is of poor quality. Cotton would do well if properly cultivated. The climate of the plains is hot, and the fruits are those of India, but in the valleys of the highlands the apricot, grape, and fig grow to perfection. Excellent wine, resembling that of Shiraz, is made in large quantities. The camels and asses of Oman are celebrated, and the latter are largely exported. Horses are few and are generally inferior, but occasionally good ones are imported from Nedjed. The cattle are of the humpbacked Indian variety. Sheep and goats are raised in vast flocks, and common fowl are numerous. Delicious fish are caught on all the coasts, and the ports are sometimes almost blocked with sardines. Dried and salted fish are put up in large quantities, and exported to India, Morocco, and even to Australia. In some of the larger towns, particularly in Sharja, Muttra, and Sohar, there is considerable manufacturing of gold and silver filigree, for the ornamentation of arms, belts, seats, pipes, &c. Other manufactures are coarse woollen and

cotton cloths, carpets and coverlets, silk stuffs for women, and sugar.—Oman proper is divided by the range of mountains into several districts. Sur comprises the coast between Ras el-Hadd and Muscat, extending to the mountains, which approach the sea gradually, and at their southern extremity rise steep and rugged from the shore. Jailan lies S. W. of Sur, on the other side of the mountains; it stretches indefinitely down the W. coast, is sandy and uncultivated, and is inhabited principally by the great tribe of Hinawy or Hinawy Bedouins. Jebel Akhdar, N. W. of Jailan, the most mountainous and richest of the districts, is occupied by the Yaaribah tribe; its principal cities are Rastag, the former capital, Bahila, Nezwa, and Haja. N. W. of Jebel Akhdar is Dahira, which is traversed by the secondary chain of mountains leading to the Persian gulf; it is inhabited chiefly by the Ghafary Bedouins. Bereima, its principal city, which commands the defiles of the grand chain, is occupied by a garrison of Wahabee troops, charged with assuring the payment of the annual tribute to Nedjed. On the other side of the mountains, E. of Jebel Akhdar and Dahira, is Batina, which consists of a vast plain rising gradually from the sea into hills covered with vegetation. Between Batina and Sur, on the coast, is the district of Muscat, which comprises little more than the cities of Muscat and Muttra and their environs. (See MUSCAT.) Sharja, on the coast of the Persian gulf, is virtually independent; it is inhabited by the Jowasim or Kawasim Arabs. The Benu Yass occupy the coast beyond Sharja. The dependencies of Oman on the coast of Persia are rented from the shah. They include the port of Bunder Abbas, formerly called Gombrun, and its dependencies, the islands of Kishm and Ormuz, and the smaller islands along the coast. The sovereigns of Oman had held these for more than a century, on the annual payment of 6,000 tomans; but in 1854 the shah seized the fortified places and expelled their officials. In 1856 a treaty was concluded by which the ruler of Oman was permitted to retain them for 20 years, at the expiration of which they were to revert to Persia; and the rental was raised to 16,000 tomans. Besides Muscat and its suburb Muttra, the chief seaports and centres of trade are Khur-Fahkan, Shinaz, Sohar, So-weik, and Barka. The entire coast from Ras el-Hadd northward is lined with towns and villages, many of which are mere collections of huts, but have large fisheries and trade. The principal port on the Persian gulf is Sharja. The S. coast has many small villages, peopled chiefly by negroes. Muscat is generally regarded as the capital of Oman, but Palgrave says that Sohar, Nezwa, and Bahila hold a similar rank, and are in turn the sovereign's place of residence. The inhabitants of the interior are engaged mostly in pastoral and agricultural pursuits; those on the coast are traders, fishermen, and mariners. The townspeople are mixed

largely with Persian, Indian, and negro blood. Most of the commerce is in the hands of Banians from Kutch and Guzerat in India. The Bedouins are a strong, athletic, and handsome race, much superior physically to those further north. The natives of Oman call themselves Abadites, and profess a Mohammedanism largely mixed up with elements of more ancient and foreign creeds; but toleration exists for all religions, races, and customs, and the people are said to be the most hospitable of the Arabs.—Oman is ruled by a sovereign whose proper title is seyid. By Europeans he is called sometimes imam of Muscat and sometimes sultan of Oman; but the latter title has never been borne by any of the rulers, and the former has not been used during the present century. The government is less a royalty than a union of independent municipalities, each city and village having its own corporation and customs. The prerogatives of the sovereign consist in the right to name and to depose governors, although he is restricted in his choice to the family who hold the office hereditarily; in the power to fix customs and duties; in the exclusive possession of a navy and of his little army of 500 or 600 men, composed of Arabs, Persians, and Belooches; and in the management of all foreign alliances and treaties, and the making of peace and war. The administration of justice is reserved to the cadis and sheiks of each locality. Taxes are fixed and immutable, and the seyid cannot modify them. All his power depends on the good will of the people, and on the amount of money he may have wherewith to buy support. The revenues derived from import duties on merchandise and slaves, and taxes on interior commerce and local industry, have been farmed of late years to an English house in Bombay, for the annual sum of \$115,000. The tribute from Zanzibar, the income from commerce carried on in the seyid's own name, and the revenue from the Persian coast and the islands, which are not included in the contract with the English house, raise the total revenue to something less than \$200,000.—The ruling dynasty of Oman was founded about 1750 by Ahmed ibn Said. Previously the sovereign was elected on account of personal merits, irrespective of descent, but since Ahmed's accession the election has been restricted to his family. He died about 1775, after bringing the country to a high state of prosperity. In 1784 Zanzibar was captured, and a few years later the authority of Oman was extended to the mainland of Africa. About 1800 the Wahabees invaded Oman, and by repeated invasions in after years reduced it nearly to the verge of ruin, withdrawing finally only on condition of the payment of an annual tribute. After the recovery of Nedjed from the Egyptian conquest, Turkey, the Wahabee ruler, attempted to reassert his claims in Oman, but in 1833 agreed to accept an annual tribute of 5,000 German crowns. In 1845 Faisul, son of Turkey, who had returned to Nedjed after

the second Egyptian invasion, sent an army into Oman, but accepted the terms offered by the seyid. The tribute was continued till 1852, when further demands were made by the Wahabee ruler, and it was increased to 12,000 crowns. The seyid Said died in 1856 after a reign of half a century, leaving 15 sons. At this time Oman was rich and prosperous. Her government extended over the best part of the Arabian coast, the islands of Zanzibar, Pemba, and Monfia, and a large portion of the African coast opposite; and her navy numbered 40 ships, 12 of which carried from 10 to 50 guns each. But with the death of Said internal dissensions began, and the succession was disputed. Thoweiny, the eldest son, was elected ruler of Oman, and Majid, his brother, of Zanzibar. After a long dispute, the rival claims of the brothers were submitted to the arbitration of Lord Canning, then governor general of India, who confirmed each in his sovereignty, and decreed that the seyid of Zanzibar should pay an annual subsidy to Oman of 40,000 crowns. In making the award, regard was had to the fact that Oman was burdened with a tribute to the Wahabees, then increased to 20,000 crowns, the half of which had previously been drawn from the treasury of Zanzibar. The terms were accepted by each in 1862, and since then Zanzibar has been independent. For the past ten years Oman has been the scene of dissension, brought about by the rival claims of different members of the ruling family to the sovereignty, and the continued interference of the Wahabees. In 1873 the seyid of Oman made a treaty with England for the suppression of the slave trade.

OMAR I. (ABU HAFSAH IBN AL-KHATTAB), the second of the caliphs, third cousin of Abdallah, the father of Mohammed, born about 581, assassinated in 644. Originally an enemy of the prophet, he set out for Medina to murder him; but chancing to read what is now the 20th chapter of the Koran, he was converted, and thenceforth became a zealous supporter of the Moslem faith. When the prophet died in 632, Omar resigned his claim to the supreme rule in behalf of Abubekr; and the latter on his deathbed appointed him his successor (634). During his reign the Moslems were everywhere victorious. One army prosecuted the conquest of Syria, took Damascus in 635, defeated the Greeks in the bloody battle of Yermuk, and in 637 compelled Jerusalem to capitulate. Another army under Amru invaded Egypt, reduced Alexandria, and overran Africa as far as the deserts of Tripoli and Barca. In Persia and Armenia the Moslems were also successful. A Mohammedan historian sums up the conquests of Omar by saying: "He took from the infidels 36,000 cities or castles, destroyed 4,000 temples and churches, and founded or endowed 1,400 mosques." In the beginning of November, 644, while performing his morning devotions in the mosque at Medina, he was stabbed three times by a Per-

sian slave named Firuz, who had applied to him in vain to be relieved of half the tribute he was compelled to pay his master. He lingered five days, and refused to name his son as his successor. Omar's only food was barley bread and dates; his only drink, water; and his garment an old coat torn in twelve places. He regularly distributed the contents of his treasury among his soldiers and followers, and supported himself by the work of his own hands, manufacturing and selling leather belts. He was the first to assume the title of *emir el-mumenim*, or commander of the faithful. In his time the era of the Hegira was established, armies were first kept under pay, and a sort of police force was instituted. Omar has always been an object of reverence among the Moslems of the Sunni or orthodox sect. He was succeeded by Othman.

OMAR II. (ABU HAFS), eighth caliph of the Ommyyades, succeeded Solymán in September, 717, died early in 720. He was a descendant of Omar I. To reconcile the houses of Omar and Ali, he revoked the maledictions against the partisans of the latter, which had been read in all the mosques since the time of Moawiyah, and restored to them the lands given to Ali by the prophet. But members of the ruling family gave him a slow poison, of which he died.

O'MEARA, Barry Edward, an Irish surgeon, born about 1780, died in London, June 3, 1836. He entered the army at an early age, and served several years in Sicily, Egypt, and Calabria, as assistant surgeon to the 32d regiment. He was afterward surgeon in the navy, and was appointed to the *Bellerophon* in July, 1815, when Napoleon came on board that ship as a prisoner. At the request of Napoleon, O'Meara accompanied him to St. Helena in the capacity of medical attendant; but on account of a rupture with Sir Hudson Lowe in regard to the treatment of Napoleon, he returned to England in 1818. Having accused Sir Hudson Lowe before the admiralty of cruel and arbitrary conduct, his name was erased from the list of naval surgeons. He afterward acted with the extreme liberals, and was a partisan of O'Connell. He published "Letters from the Cape of Good Hope;" "Letters from St. Helena;" "Letters from Count Las Cases," with a preliminary discourse; "Exposition of the Treatment of Napoleon Bonaparte;" a translation of the "Memoirs of Napoleon" by himself; and "A Voice from St. Helena, or Napoleon in Exile."

OMEN (Lat.), a sign believed to be an intimation from a superior power prognosticating a future event. Suetonius mentions that Cæsar, on landing at Hadrumetum in Africa, fell on his face, which would have been an unlucky omen had he not transformed it into a symbolical act by exclaiming as he touched the earth: *Teneo te, Africa* (I take possession of thee, O Africa). Valerius Maximus relates that Pompey, on arriving at Paphos after the battle

of Pharsalia, lost all hope when he learned the name of the palace concerning which he inquired (*Κακοβασιλεία*, evil palace). It is related by Winsheim that Melanchthon went from the assembly at Torgau in anxious doubt concerning the future of the reformation, but found in the antechamber three women, one of whom was holding a new-born child, another supporting and instructing a boy, and the third giving food to a full-grown man; and that he immediately returned into the hall, and so encouraged the assembly by reporting the favorable symbolical omen, that bolder and more decisive resolutions were at once carried. Sneezing was deemed ominous in the time of Homer, and Eustathius says it is lucky or unlucky according as it is directed to the right or the left. Among the ancient Persians sneezing was esteemed fortunate, a sign of contest between the fiery soul and the earthly body, and of the victory of the former. In parts of Scotland and in some other localities, it betokens good fortune during the month to see the new moon for the first time on the right hand or directly in front; to turn the head back to see it, especially over the left shoulder, foreshadows the worst fortune. It is also held unlucky to look at the new moon for the first time through a window. Dr. Nathaniel Home, in his "*Dæmonologie*," mentions the falling of salt toward persons at table and the spilling of wine on their clothes as evil omens. Putting the shoes on awry or on the wrong feet has often been thought the forerunner of some unlucky accident. Breaking a looking glass betokens the death of the best friend of the person to whom it belonged. Sir Thomas Browne discusses the proverb that our cheeks burn or ears tingle when others are talking of us; the left cheek or ear indicating that they are talking ill, the right good of us. Grose affirms that a drop of blood from the nose foretells death or a severe fit of sickness; and Burton in his "*Anatomy of Melancholy*" says that "to bleed three drops at the nose is an ill omen." The screeching of the owl and the croaking of the raven have both in ancient and modern times been regarded as omens of calamity. Pennant states that many of the great families of Scotland received monitions of future events, especially of death, by spectres, wraiths, and shrieks. Among sailors, to throw a cat overboard, or lose a bucket, is believed to be unlucky. To stumble on going out, says Bishop Hall, is mischievous; to stumble up stairs, says Grose, is lucky.

OMENTUM, a membranous sheet, composed of two or more folds of the peritoneum extended between certain of the abdominal organs. Three parts of this sheet are usually distinguished, namely: the gastro-hepatic omentum, a double fold, extending from the liver to the stomach; the gastro-splenic omentum, a double fold extending from the great pouch of the stomach to the spleen; and the great omentum, a quadruple fold, suspended from the great curvature of the stomach and the

transverse colon, and hanging down in front of the mass of the small intestine. The great omentum is distinguished from the others by containing, sometimes in considerable quantity, a collection of adipose tissue, which forms an anterior covering or protection for the small intestine. A portion of it sometimes protrudes, either alone or in company with a knuckle of intestines, into the sac of a hernia. When the omentum alone protrudes, it constitutes omental hernia.

OMER PASHA (MICHAEL LATTAS), a Turkish soldier, born at Plaski, Croatia, in 1806, died in Constantinople, April 18, 1871. The son of an Austrian official, he became a cadet in a frontier regiment, but ran away in 1826 and went to Bosnia, where he became a Mohammedan and took the name of Omer. He was appointed tutor to the children of Hussein Pasha, who in 1834 sent him to Constantinople, where he became an army officer and writing master to Abdul Medjid. He assisted in reorganizing the army, was made colonel in 1839, served against Ibrahim Pasha, and was promoted to brigadier general. He was prominent in the pacification of Albania and Kurdistan, in 1848 commanded the Turkish troops in Moldo-Wallachia, and in 1849-'50 completely crushed the insurrection in Bosnia. In 1851 he restored tranquillity in Herzegovina, and in 1852 was sent against the Montenegrins. On the outbreak of the Crimean war he was appointed generalissimo. In November, 1853, the Russians attacked him at Oltenitza, but were driven back with great loss. Their subsequent operations in front of Widin were equally unsuccessful. In May, 1854, he was besieged by Paskevitch in Silistria, but at the end of 40 days the Russians were compelled to give up their attempts after severe losses. In August he entered Bucharest, and early in 1855, acting in conjunction with the allies, he removed more than 35,000 men of his Danubian army to Eupatoria in the Crimea, and began the fortification of that place, where he was attacked on Feb. 17 by a Russian force estimated at 40,000, which he repulsed. He joined the allied army before Sebastopol, and in the spring marched to the relief of Kars, which was captured before he could reach it. Afterward as governor general of Bagdad he repelled the Kurd and Arab invasion. He was convicted of frauds and of inflicting arbitrary sentences of death, and banished to Kharput in 1859, but was soon restored to his command. He invaded and pacified Montenegro in 1862, and was stationed at Shumla till March, 1867, when he was ordered to crush the Cretan insurrection; but his violence and cruelty caused his recall in October, and he was withdrawn from active service. Pending the arrival of the new minister of war from Bagdad in 1868, he held that office till November, 1869, and subsequently remained a member of the ministry without a portfolio.

OMISH. See MENNONITES.

OMMIYADES, the second dynasty of oriental caliphs, beginning with Moawiyah, the son of Abu Sofian, in 661, and continuing until 750. They derived their name from Ommiyah, an ancestor of Moawiyah. The latter had during the lifetime of Ali, the fourth caliph of the first or Arabian dynasty, made himself master of Syria and Egypt, and after the assassination of Ali gained possession of the whole empire, through the abdication of his successor Hassan. The office of caliph now became hereditary in the family of this monarch, and so continued until the defeat and death of Merwan II., the 14th sovereign of the line (750). During the sway of this dynasty, Turkistan, Spain, and Georgia were conquered. But the progress of the Moslem arms was retarded by constant civil dissensions, and in Europe their conquests were effectually stayed by their defeat on the plains of Poitiers (732). After the contest between Merwan II. and Abul Abbas had ended in the defeat of the former, Abdullah, an uncle of Abul Abbas, called a meeting of the Ommiyades, and treacherously massacred them all but two. One of these fled to Arabia, where his descendants ruled as late as the 16th century; and the other escaped to Mauritania, whence he was called to Spain, and founded the kingdom and subsequent caliphate of Cordova as Abderrahman I. (See CALIPH.)

OMPHALE, in Greek legends, the daughter of the Lydian king Jardanus, and wife of Tmolus, whom she succeeded in the government. Mercury sold Hercules to her for a slave, and by him she had several children. Hercules, to please her, assumed female garments and spun among the female slaves, while she wore the lion's skin and wielded the club.

OMRI, king of Israel. See HEBREWS, vol. viii., p. 587.

OMSK, a town of Siberia, in the government and 300 m. N. E. of the city of Akmolinsk, on the Irtysh at the confluence of the Om; pop. in 1867, 26,722, among whom are many European exiles. It was formerly the seat of the governor general of Western Siberia and capital of a government of its own name, which is now divided between the governments of Tobolsk, Tomsk, and Akmolinsk. It has five Greek churches, a Protestant church, a mosque, and a military school, founded in 1825 by the emperor Alexander I. for 250 pupils, who are instructed in the Kirghiz and Mongol languages. There are manufactories of cloth, and a brisk trade is carried on with the Kirghiz.

ON. See HELIOPOLIS.

ONCKEN, Johann Gerhard, a German missionary, born at Varel, Oldenburg, about 1800. During his early life he was a domestic servant. After reaching manhood he visited England, where he married, and subsequently opened a book shop at Hamburg, joined the English Independent church, and became the agent of the Lower Saxony tract society and the Edinburgh Bible society. In April, 1834, with six others, he organized a Baptist church, and be-

came its pastor. In 1835 the American Baptist general convention appointed Mr. Oncken their missionary, and he visited almost every portion of Germany and Denmark. In Hamburg he was several times imprisoned for preaching and baptizing; but after the benevolence of his family and congregation to the sufferers by the great fire of 1842, the Hamburg senate passed decrees commending their conduct, and granting them the privilege of unrestricted worship. From that time Mr. Oncken has been actively engaged in the promotion of his missionary work, publishing editions of the Scriptures for gratuitous distribution, writing and publishing religious tracts and books, establishing numerous churches in Denmark, Switzerland, Prussia, the smaller German states, and Austria, and editing with the assistance of his daughter a religious journal in English, and another in German. He visited the United States in 1852 to obtain means for the erection of chapels. At the end of 30 years the number of churches connected with the Baptist German mission, and directly or indirectly the fruit of his labors, had risen to 76, and the number of members in communion to 11,289. In connection with these churches were 95 Sunday schools, with 240 teachers and 2,662 scholars. The missions have continued to prosper, and their fruits are found in Poland and southern Russia.

ONDERDONK. I. Henry Ustick, an American bishop, born in New York in March, 1789, died in Philadelphia, Dec. 6, 1858. He graduated at Columbia college in 1805, studied medicine in New York and Edinburgh, and in 1815 became associate editor with Dr. Valentine Mott of the "New York Medical Journal." He afterward studied theology, and was admitted to the ministry of the Protestant Episcopal church. In 1820 he became rector of St. Ann's church, Brooklyn, N. Y.; and in 1827 he was elected assistant to Bishop White of Pennsylvania, on whose death in 1836 he became bishop of that diocese. In 1844 he offered his resignation to the house of bishops, who not only accepted it, but also, after a trial on charges of intemperance, suspended him from the office and functions of the sacred ministry from and after Oct. 21. The suspension was removed in 1856, but he did not resume his episcopal functions. Bishop Onderdonk wrote several hymns contained in the Episcopal prayer book. His principal publications are: "Episcopacy tested by Scripture," published as a tract, and afterward enlarged to a volume entitled "Episcopacy Examined and Reexamined," containing reviews adverse to the tract by Albert Barnes and others (1835); "Essay on Regeneration" (1835); and "Sermons and Charges" (2 vols., 1851). **II. Benjamin Tredwell**, an American bishop, brother of the preceding, born in New York in 1791, died there, April 30, 1861. He graduated at Columbia college in 1809, studied theology, entered the Episcopal ministry in 1812, and in 1813 was appoint-

ed an assistant minister of Trinity parish, New York. On Bishop Hobart's death he was chosen bishop of New York, and consecrated Nov. 26, 1830. In 1838 the diocese of Western New York was formed, Bishop Onderdonk retaining the eastern portion. Charges affecting his moral character having been made, he was tried in December, 1844, by the house of bishops acting as a court; and after a long and searching investigation, the court decided (eight voting for deposition and nine for suspension) that he be suspended from the office and functions of the ministry, Jan. 3, 1845. He never acknowledged that he was guilty of the offences imputed to him, and urgent efforts were made for the removal of the suspension. After much delay, the general convention of 1850 passed a canon allowing a provisional bishop to be chosen. The convention of New York adopted a petition to the general convention of 1859 in favor of Bishop Onderdonk's restoration, and the lower house supported it by a large vote; but the bishops rejected it.

O'NEALL, John Belton, an American jurist, born on Bush river, S. C., April 10, 1793, died near Newberry, Dec. 27, 1863. He graduated at the South Carolina college in 1812, served for a time in the war with England, was admitted to the bar in 1814, and soon gained a large practice. In 1816, '22, '24, and '26 he was a member of the legislature. In 1850 he became president of the court of law appeals and of the court of errors, and subsequently chief justice of the state. In 1852 he was installed as the head of the sons of temperance of North America. He published a "Digest of the Negro Law of South Carolina" (1848), "Annals of Newberry" (1858), and "Biographical Sketches of the Bench and Bar of South Carolina" (2 vols., 1859).

ONEGA, a lake of N. W. Russia, in the government of Olonetz, between lat. 60° 50' and 63° N.; extreme length 160 m., greatest breadth 50 m.; area, 4,000 sq. m. Its S. end is about 100 m. E. of the middle of Lake Ladoga, next to which it is the largest body of fresh water in Europe. The N. part is very irregular in shape. The surface is dotted with islands, the shores are generally rocky, and the water is clear. Navigation is impeded by shoals and sand banks. At its S. W. extremity it is connected with Lake Ladoga by the river Svir; and the Murinskoi canal unites its affluent the Vytegra with a tributary of Lake Bielo, the outlet of which flows into the Volga. It is, however, unconnected with the river Onega, which rises in Lake Latcha, on the S. border of Olonetz, and flows through Archangel into Onega bay, an inlet of the White sea.

ONEIDA. **I.** A central county of New York, drained by the Mohawk and Black rivers and their tributaries; area, 1,127 sq. m.; pop. in 1870, 110,008. Through the central part of the county a broad valley extends from E. to W., and toward the north and south the surface is broken and hilly. The soil is generally

rich and very fertile. Oneida lake lies on the W. border. The county is traversed by the Erie and Chenango canals, and partly by the Black River and the Oneida Lake canals; and the New York Central and other railroads intersect at Rome and Utica. The chief productions in 1870 were 68,342 bushels of wheat, 377,966 of Indian corn, 968,215 of oats, 113,462 of barley, 45,764 of buckwheat, 878,434 of potatoes, 3,651,127 lbs. of butter, 1,228,459 of cheese, 100,456 of wool, 57,908 of maple sugar, 3,152,403 of hops, and 218,811 tons of hay. There were 15,231 horses, 65,264 milch cows, 22,577 other cattle, 25,812 sheep, and 19,085 swine; 14 manufactories of agricultural implements, 13 of boats, 10 of boots and shoes, 11 of brick, 53 of carriages and wagons, 86 of cheese, 13 of cotton goods, 4 of glass, 5 of hosiery, 27 of iron (including 23 of castings), 30 of tanned and 16 of curried leather, 26 of machinery, 10 of woollen goods, 2 distilleries, 8 breweries, 30 flour mills, 8 saw mills, and 69 planing mills. Capitals, Rome and Utica.

II. The S. E. county of Idaho, bounded N. by Montana, E. by Wyoming, and S. by Utah; area, 17,850 sq. m.; pop. in 1870, 1,922. It is drained by the head waters of Snake river and by Bear river. The surface in portions is uneven and mountainous, but there are rich lands adapted to agriculture in the river bottoms. Bear Lake valley in the S. E. part is settled chiefly by Mormons, whose farms are well cultivated and stocked. Capital, Malade City.

ONEIDA, a lake in the central part of New York, lying between Oswego, Oneida, Madison, and Onondaga counties, at an elevation of 369 ft. above tide water, 23 m. long and 4 to 7 m. wide. It forms a link in the chain of internal navigable waters of the state, and its outlet, Oneida river, after a course of 16 m., falls into the Oswego river. It abounds in fish.

ONEIDA COMMUNITY. See NOYES, JOHN HUMPHREY.

ONEIDAS, a tribe of American Indians forming part of the Iroquois confederacy. They were a secondary tribe set off from the Mohawks. Their territory extended from Deep Spring, near Manlius, Onondaga co., N. Y., to a point below Utica, Oneida co. Their totem was a stone in a forked stick, and their name meant "tribe of the granite rock." They had three clans, the Wolf, Bear, and Turtle, and nine sachemships. Soon after the settlement of Canada they became engaged in hostilities with the French and their allies the Hurons and Montagnais, and were always very difficult to manage. With the Onondagas they made peace with Canada in 1653, and received missionaries, who continued their labors at intervals to the close of the century. They then had not more than 150 warriors, having been reduced by war with southern tribes. They joined in the general treaty of peace with the French, Sept. 8, 1700; but in all subsequent wars they acted on the English side. At the revolution they alone in the great council of

the confederacy opposed taking sides with the English, and with the Tuscaroras they remained faithful to the colonists. They were consequently driven from their homes, their houses and church were burned, and their property was destroyed. For this the United States made compensation by treaty of Dec. 2, 1794. Previously they had by treaties of June 28, 1785, and Sept. 22, 1788, ceded their lands to the state of New York, reserving a tract which was not to be sold at any time, or leased, except in part. The Brotherton and Stockbridge Indians, who had received lands from the Oneidas, were to retain them. Some then emigrated to Canada and settled on the Thames; and a large band in August, 1821, purchased a tract on Green bay. The three bands have advanced in agriculture and the mechanic arts, while schools and churches have fitted them for the duties of citizens. In 1873 there were 266 Oneidas in New York, chiefly near Oneida Castle on the state reservation, with two schools; 1,279 in Wisconsin, on a reservation of 65,000 acres, with 240 out of 400 children in their two schools, very little intemperance, and many well cultivated farms; and 633 on the Thames in Ontario; in all, 2,178, many more than the tribe has previously had since its first intercourse with the whites.

O'NEIL, Henry. See supplement.

• **O'NEILL, Eliza**, an English actress, born in Ireland about 1795, died at her country seat, Ballygiblin, near Mallow, Oct. 29, 1872. Her father was a strolling comedian, and she was educated for the stage. She succeeded on her first appearance as the duke of York in "Richard III.," and acquired great popularity in London as Juliet, and in similar characters. In the height of her fame she married in 1819 William Wrixon Becher, M. P., who was made a baronet in 1831 and died in 1850.

ONEIZA, or **Anciza**, a city of Nedjed, Arabia, situated in lower Kasim, about 250 m. E. N. E. of Medina; pop. in 1862, about 25,000. It is surrounded by double walls of brick, the inner range encircling the town, which is compactly built, and the outer circle, with towers and moat, protecting the gardens and palm groves which cover the intervening space. It was for centuries the capital of the province of Kasim and one of the most important commercial centres of inner Arabia; but in 1862 it revolted against the authority of the Wahabee ruler of Nedjed, and after a long siege was carried by assault in the spring of 1863, when many of its inhabitants were massacred, and the best part of it was destroyed.

ONGARO. See DAL' ONGARO, FRANCESCO.

ONION (from *unio*, the Latin name for a large kind of onion), the common name of the plant *allium cepa*. The genus *allium* (the ancient name for garlic) includes, besides several wild species, the cultivated garlic, leek, shallot, and chives. It belongs to the lily family, and is distinguished from related genera by its coated bulb, a naked scape, bearing at the top a simple

umbel from a one- or two-leaved spathe, which soon becomes dry, and six-parted flowers, the divisions of which are white or colored and one-nerved; the style thread-like, stigma simple, fruit a three-lobed, three-celled pod, with one or few seeds in each cell. All species have the pungent taste and odor known as alliaceous. The leaves in the onion (*A. cepa*) are cylindrical, hollow, and shorter than the inflated flower stalk, and the flowers white; in this, as in some other species, small bulblets are sometimes produced in place of the flowers. Its native country is supposed to be western Asia, probably between Palestine and India; species so nearly related that they have been taken for *A. cepa* are found in Siberia. The onion was among the earliest cultivated vegetables, and in Egypt was a sort of divinity. The plant is a biennial, forming a bulb the first season from the seed, and the next year throwing up its flower stalk, producing seed, and perishing; but there are deviations from this,



Potato or Multiplier Onions.

and there are two distinct races which reproduce differently. The potato onions, also called multipliers, do not produce seed or even flowers, but form a great number of small bulbs; one of these, the size of a walnut or smaller, planted in the spring, will grow to a large bulb, which if set out the next spring will produce numerous small bulbs of different sizes. Another race is the top or tree onion, which instead of flowers produces at the end of the stalk a cluster of small bulbs or onions about the size of a filbert; these when planted will grow to a good size, and if the bulbs thus obtained are set out the next spring, they will produce a crop of small bulbs. Neither of these sorts is much cultivated except in private gardens, but the great supply is furnished by the ordinary seed-bearing kind. In most northern localities the seed is sown in spring and the bulbs mature in early autumn; south of New York the development of the bulbs is arrested by dry weather, and without irrigation the crop will usually fail; in such localities onions are raised from sets, small bulbs of the size of a pea or larger grown the season

before; the seed is sown very thickly in rather poor soil, and the bulbs ripen when very small; these sets are kept until spring, and planted instead of seed. In localities where the win-



Top Onions, Natural Size.

ter will allow, the seed is sown in August, and the young plants, left in the ground all winter, start early the following spring. In parts of Hartford co., Conn., Orange co., N. Y., Rhode Island, and in some localities of Iowa and other western states, onions are the staple product. They can be grown upon the same ground year after year without deterioration, and there are cases in which the same land has produced onions continuously for half a century or more. High manuring is required. The seed (always of the previous year) is sown by a machine in drills about 15 in. apart as early as possible; as soon as the plants appear weeding is begun, and it is continued unremittingly as long as there is need of it. The maturity of the bulbs is shown by the falling over of the tops; some plants will not form good bulbs, or "bottom out," but remain with a thick stem like a leek, and are known as scallions. The onions are pulled, and allowed to cure in the sun a few days. In storing for the winter they must not be in quantities large enough to heat; freezing does not injure them if they thaw gradually. Seed is raised by setting out well kept selected bulbs in rich ground, giving support to the flower stalks by means of stakes and strings, and gathering before the seed shells out. The varieties are numerous, though there are but few which are regarded as standard; there are red, yellow, and white-skinned onions, and of each of these flat, globular, and oval forms; the Weathersfield red, yellow Danvers, and white Portugal or silver-skin are the most grown. Italy, Spain, Mexico, and California are noted for the great size and fine quality of their onions, but the superiority is due to soil and climate rather than to the variety. The great enemy to the crop is a maggot, the larva of *anthomyia ceparum*,

a small fly, known as the onion fly; it lays its eggs on the small plants near the ground, and the maggot finds its way to the forming bulb, which it feeds upon and kills; no practicable remedy has been found for this, or for a smut which sometimes appears on the young plants. The odor of onions is due to a volatile oil similar to if not identical with that of garlic, and their physiological effects are similar, but milder; they are largely used as seasoning, and are eaten both raw and cooked; boiling dissipates much of the oil.—The so-called Welsh onion is curiously misnamed, as the plant (*allium fistulosum*) is a native of Russia, where it is known as the rock onion. It does not form a bulb, but produces numerous coated stems much like small leeks; it is little cultivated in this country, but is useful in high latitudes where the common onion cannot be grown. The French, who call it *ciboule*, have a red and a white variety.—Cives or chives (*A. schenoprasum*), the smallest of the genus in cultivation, is found on the shores of Lakes Huron and Superior and northward; it has small oval bulbs not over half an inch in diameter, numerous small cylindrical leaves about 8 in. long, and clusters of purplish, not inelegant flowers; it rarely matures seeds, but the bulbs are pro-



Cives (*Allium schenoprasum*).

duced by offsets in great numbers, and form dense clumps several inches in diameter; it is propagated by dividing the clumps. The leaves are used, cut when young and tender.

ONLAF. See AULAF.

ONONDAGA, a central county of New York, bounded N. E. by Oneida lake, and watered by the Oswego, Seneca, and Oneida rivers, and various creeks; area, 812 sq. m.; pop. in 1870, 104,183. Its surface is hilly but not broken in the south and level in the north, and the soil is remarkably fertile. It contains several lakes, of which the principal are Onondaga, Cross, Skaneateles, and Otisco. The Onondaga salt springs are in the valley of Onondaga lake, and

yield large quantities of salt, the value in 1870 being \$1,017,569. The Erie canal traverses the county, connecting at Syracuse with the Oswego canal, which extends to Lake Ontario. The New York Central railroad passes through Syracuse, from which various branches radiate. The chief productions in 1870 were 573,183 bushels of wheat, 566,558 of Indian corn, 1,119,263 of oats, 541,770 of barley, 51,249 of buckwheat, 589,816 of potatoes, 2,375,577 lbs. of butter, 821,562 of cheese, 339,740 of wool, 1,257,603 of tobacco, 233,399 of hops, 56,505 of flax, and 118,629 tons of hay. There were 15,162 horses, 29,394 milch cows, 17,835 other cattle, 63,265 sheep, and 16,826 swine; and numerous manufacturing establishments, of which the principal were 14 of agricultural implements, 17 of brick, 50 of carriages and wagons, 27 of cheese, 69 of cooperage, 2 of edge tools and axes, 7 of hardware, 18 of iron in various forms, 12 of machinery, 7 of musical instruments, 11 of paper, 20 of plaster work, 96 of salt, 31 of tobacco and cigars, 7 of woollen goods, 32 flour mills, and 34 saw mills. Capital, Syracuse.

ONONDAGAS ("Men of the Mountain"), one of the five Iroquois tribes in the state of New York. They were the head of the confederacy, the *atotarho*, its great sachem, being the first of the 14 sachems of these tribes. The councils of the confederacy were held at Onondaga, and the wampum belts or records of treaties were here preserved. Their territory extended from Deep Spring near Manlius, Onondaga co., W. to a line between Cross and Otter lakes. The Onondagas were early at war with the Hurons, Montagnais, and Algonquins of Canada, and later with the French. They took a prominent part in the destruction of the Hurons and Neuters. Finding the Eries and Susquehannas less easy to subdue, they made peace with the French in 1653 and solicited missionaries. A French settlement was formed among them at Ganantaa in 1657, but was abandoned the next year in consequence of a plot for the massacre of the settlers. Garakonthie, an Onondaga chief, for many years labored to effect a lasting peace with the French. In 1662 a large Onondaga force ravaged Montreal island and killed Lambert Closse, the greatest Indian fighter of Canadian annals. After De Tracy's Mohawk campaigns they made peace, and in 1668 the French mission was reestablished. England was now extending her influence, and Onondaga became the centre of the intrigues of the two nations. After the fall of James II. the Iroquois were won to the English side, and a fort was erected at Onondaga. In 1696 Frontenac, at the head of a large force, invaded the Onondaga country, and the Indians retired to the woods after destroying the fort and their village. French envoys were sent to Onondaga in 1700, and deputies of the tribe soon after signed the general treaty of peace at Montreal. In 1709 the Onondagas again took

up the hatchet against the French, and the missionaries finally retired. After this the Onondagas generally served against the French, though occasionally neutral, till the overthrow of the French power. At the outbreak of the American revolution a council was held at Onondaga, but as the Oneidas and the Tuscaroras opposed their joining the English side, each tribe was left to its own course; and in 1777 the council fire at Onondaga was formally extinguished. After Van Schaick's expedition against them, they joined the English. The war left them helpless. On Sept. 12, 1788, they ceded all their lands to the state of New York, except a reservation specially set apart for them, and a small annuity was promised them. They have continued to hold this tract, a part having embraced Christianity, while others adhere to their ancient rites. Schools are maintained on the reservation, and they have improved slowly. Of 464 Onondagas, 339 are on the reservation, the rest being with the Senecas and Tuscaroras. Their population has not increased or diminished materially during the past 50 years. In the province of Ontario, Canada, there are 410 Onondagas, making the whole tribe 864. Two centuries ago (1677) they were able to raise 350 fighting men. The Onondaga is regarded by the Indians themselves as the noblest and purest of the Iroquois dialects. A French Onondaga dictionary, from a manuscript of the 17th century, was published at New York in 1859.

ONSLow, a S. E. county of North Carolina, bordering on the Atlantic ocean, and drained by New river; area, about 700 sq. m.; pop. in 1870, 7,569, of whom 2,396 were colored. The surface is level, and comprises extensive swamps and sandy pine barrens. The soil is productive. The chief productions in 1870 were 117,420 bushels of Indian corn, 31,385 of peas and beans, 62,186 of sweet potatoes, 881 bales of cotton, and 10,590 lbs. of rice. There were 469 horses, 323 mules and asses, 1,700 milch cows, 2,956 other cattle, 1,849 sheep, and 8,786 swine; 4 manufactories of tar and turpentine, and 7 flour mills. Capital, Onslow Court House.

ONSLow, George, a French composer, born in Clermont, Auvergne, July 27, 1784, died there, Oct. 3, 1853. He studied music under Hüllmandel, Dussek, and Cramer, was instructed in harmony by Reicha, and devoted himself to composition. His life was passed mainly upon his estate in Auvergne. He left three operas. *L'Alcade de la Vega* was brought out at the Théâtre Feydeau in 1824, *Le colporteur* in 1827, and *Le duc de Guise* in 1837. Neither these nor his symphonies were successful, but his quartets and quintets for stringed instruments were more popular. He succeeded Cherubini as a member of the academy of fine arts. Halévy pronounced his eulogy before this body.

ONTARIO, a W. county of New York, drained by the Honeoye outlet, a tributary of the

Genesee, Canandaigua outlet, and Mud creek, tributaries of the Clyde; area, 606 sq. m.; pop. in 1870, 45,108. Its surface is hilly and broken toward the south, undulating toward the north, and the soil is generally very fertile. Several beautiful lakes lie in the county, among which are Canandaigua, Honeoye, Canadice, and Hemlock. Seneca lake lies partly on the E. border. The New York Central and the Northern Central railroads traverse it. The chief productions in 1870 were 863,558 bushels of wheat, 727,661 of Indian corn, 898,568 of oats, 557,084 of barley, 37,204 of buckwheat, 584,259 of potatoes, 1,288,820 lbs. of butter, 96,493 of cheese, 743,306 of wool, 605,910 of hops, and 78,499 tons of hay. There were 13,324 horses, 11,789 milch cows, 10,657 other cattle, 131,485 sheep, and 12,076 swine; 11 manufactories of agricultural implements, 9 of brick, 27 of carriages and wagons, 7 of iron castings, 4 of tanned and 4 of curried leather, 8 of malt, 2 of woollen goods, 20 flour mills, 28 saw mills, 4 planing mills, and 2 breweries. Capital, Canandaigua.

ONTARIO (formerly UPPER CANADA or CANADA WEST), a province of the Dominion of Canada, situated between lat. $41^{\circ} 30'$ and $50^{\circ} 30'$ N., and lon. $74^{\circ} 25'$ and $90^{\circ} 30'$ W.; area, according to the latest and most trustworthy estimates, 107,780 sq. m. Commencing at the W. extremity, it is bounded N. by the Northwest territories; N. E. by the province of Quebec, from which it is mostly separated by the Ottawa river; E. by the portion of Quebec between the Ottawa and St. Lawrence; S. E. by the St. Lawrence river, Lake Ontario, the Niagara river, and Lake Erie, which separate it from Quebec, New York, Pennsylvania, and Ohio; W. by the Detroit river, Lake St. Clair, the river St. Clair, Lake Huron, and St. Mary's river or strait, which separate it from Michigan; W. and S. by Lake Superior, separating it from Michigan; S. by Pigeon river, separating it from Minnesota; and then W. by the Northwest territories. It consists of an irregular triangle, of which the sides are formed by the Ottawa river on the northeast, the St. Lawrence, Lake Ontario, Niagara river, and Lake Erie on the southeast, and the Detroit river, Lake St. Clair, the river St. Clair, Lake Huron, French river, Lake Nipissing, and the Matawan river on the northwest, and of a strip, varying in width from about 30 to nearly 200 m., stretching W. from French river along the N. shores of Lakes Huron and Superior, and comprising an area of about 45,000 sq. m. The N. boundary, formed by the height of land that divides the waters flowing into Hudson bay from those flowing into Lakes Huron and Superior, is irregular, and has not been surveyed. From the E. extremity of the province, near the junction of the Ottawa and St. Lawrence, S. W. to the Detroit river, the distance is about 480 m. From the former point N. W. around the shores of the lakes to Pigeon river it is about 900 m. The distance

N. and S. between Lake Ontario and Georgian bay is 70 m.; E. and W. between Ontario and Huron, 100 m.; N. and S. between Erie and Huron, 50 m.; and E. and W. between the Niagara and St. Clair rivers, 170 m. The province is divided for municipal and judicial purposes into 37 counties or unions of counties, and 5 judicial districts, viz.: Algoma (district), Brant, Bruce, Carleton, Elgin, Essex, Frontenac, Grey, Haldimand, Haliburton (provisional), Halton, Hastings, Huron, Kent, Lambton, Lanark, Leeds and Grenville, Lennox and Addington, Lincoln, Middlesex, Muskoka (district), Nipissing (district), Norfolk, Northumberland and Durham, Ontario, Oxford, Parry Sound (district), Peel, Perth, Peterborough, Prescott and Russell, Prince Edward, Renfrew, Simcoe, Stormont, Dundas, and Glengarry (the last three united), Thunder Bay (district), Victoria, Waterloo, Welland, Wellington, Wentworth, and York. Bothwell, Cardwell, and Monck are legislative electoral districts, formed from portions of counties. The cities with their number of inhabitants in 1871 are as follows: Toronto, the capital of the province, 56,092; Hamilton, 26,716; Ottawa, the capital of the Dominion, 21,545; London, 15,826; and Kingston, 12,407. The largest towns are Brantford, pop. 8,107; St. Catharines, 7,864; Belleville, 7,305; Guelph, 6,878; Chatham, 5,873; Port Hope, 5,114; and Brockville, 5,102. Other towns and villages in the order of population, with more than 2,000 inhabitants each, are Peterborough, Cobourg, Stratford, Windsor, Lindsay, Ingersoll, Woodstock, Goderich, Galt, Barrie, Owen Sound, Strathroy, Oshawa, Dundas, St. Mary's, Bowmanville, Napanee, Sarnia, Collingwood, Whitby, Petrolia, Paris, Prescott, Perth, Picton, Yorkville, St. Thomas, Brampton, Almonte, Cornwall, Gananoque, and Clinton. Sault Ste. Marie (pop. 879), on St. Mary's strait, is the principal place in the N. W. part of the province.—Ontario is the most populous province in the Dominion, and its growth has been very rapid. The population in 1791 was about 65,000. According to subsequent censuses, it has been as follows: 1821, 122,716; 1830, 210,437; 1839, 407,515; 1848, 723,292; 1851, 952,004; 1861, 1,396,091; 1871, 1,620,851, of whom 1,131,334 were born in the province, 40,476 in Quebec, 7,852 in other parts of British America, 124,062 in England and Wales, 153,000 in Ireland, 90,807 in Scotland, 22,827 in Germany, and 43,406 in the United States. Of the total, 559,442 were of Irish, 439,429 of English, 328,889 of Scotch, 158,608 of German, 75,383 of French, 19,992 of Dutch, 13,435 of African, and 5,282 of Welsh origin; and 12,978 were Indians (chiefly Iroquois or Six Nations, with some Oneidas, Munsees, Wyandots, Ottawas, Pottawattamias, Mississaguas, Mohawks, Ojibways, &c.). There were 828,590 males and 792,261 females, 292,221 families, and 286,018 occupied dwellings. There were 57,379 persons 20 years old and upward (29,406 males and 27,973 females) unable to read,

and 93,220 (42,589 males and 50,631 females) unable to write; 1,412 deaf and dumb persons, 1,009 blind, and 4,081 of unsound mind. Of the 463,424 persons returned as engaged in occupations, 228,708 belonged to the agricultural class, 29,082 to the commercial, 26,805 to the domestic, 93,871 to the industrial, and 16,759 to the professional; not classified, 68,199. The great body of the inhabitants is settled in the S. and S. W. portions of the province. The region N. of Lakes Huron and Superior is inhabited only by a few Indians, except at some isolated points. Immigration is now directed chiefly to the district between the Ottawa river and Georgian bay, where free grants of land are offered to settlers. The number of immigrants settling in the province in 1871 was 25,842; 1872, 28,129; 1873, 39,184.—The surface of the main triangle is for the most part gently undulating. A ridge of high land enters the province at Niagara falls, extending N. W. to Hamilton, and thence to and along the peninsula between Lake Huron and Georgian bay, and through the Manitoulin islands. The Laurentian hills, crossing the Ottawa from Quebec, about 25 m. above the city of Ottawa, run S. to the St. Lawrence near Kingston, and thence W. to the S. E. extremity of Georgian bay. They then continue along the E. shore of the bay and around Lake Superior, near which they attain a height of 2,100 ft. The Blue mountains S. of Georgian bay attain a height of 1,900 ft. above Lake Huron. N. of Lake Huron the hills occasionally attain an elevation of from 400 to 700 ft. above the lake. The surfaces of these hills are generally rounded, but occasionally they exhibit rugged escarpments with surfaces of naked rock. The slopes are often gentle, and the valleys wide. The strip of country N. of Lake Superior is not well known. The shore of that lake is bold and rugged, the cliffs and eminences varying from 300 to 1,300 ft. in height. The land around Lake Nipigon is undulating and sometimes hilly, with some level tracts.—The province has a water front along the great lakes and their connecting waters of some 3,000 m., with many good harbors. By means of canals around the falls and rapids there is continuous navigation from the head of Lake Superior to the gulf of St. Lawrence. The principal bays are the bay of Quinté, shut in from Lake Ontario near its E. end by the peninsula of Prince Edward, and Burlington bay, at the W. extremity of the same lake; the bay formed by Long point in the E. part of Lake Erie, and Pigeon bay, at its W. end; Georgian bay, enclosed from Lake Huron by the peninsula of Cabot's head and Grand Manitoulin island on the west, and the North channel, between Grand Manitoulin, Cockburn, and Drummond's islands on the south, and the mainland of the province on the north; Goulais and Batchewanaing bays near the outlet of Lake Superior, Michipicoten bay further N., and Nipigon, Black, and Thunder bays at the N. W. extremity of

that lake. There are a number of inlets in Georgian bay, the most important of which are Owen sound in the southwest, Nottawasaga bay at the S. extremity, Matchedash bay in the southeast, and Parry sound on the E. shore. The most important islands belonging to the province are a part of the Thousand islands in the St. Lawrence, Wolfe and Amherst islands at the E. extremity of Lake Ontario, Long Point in the E. and Point Pelee in the W. part of Lake Erie, Walpole island at the N. E. extremity of Lake St. Clair, Grand Manitoulin and Cockburn islands, with adjacent islets, in Lake Huron, St. Joseph's island at the S. entrance of St. Mary's strait, and Caribou, Michipicoten, Pie, Slate, Simpson's, St. Ignace, and Pie islands, in Lake Superior. The Ottawa river forms the boundary of the province (below Lake Temiscamingue) for about 400 m., and is navigable by steamers in the lower portion for about 250 m. Its chief tributaries are the Montreal river, which enters Lake Temiscamingue after a S. E. course of 120 m.; the Matawan, 45 m. long, the outlet of several lakes, the westernmost of which is separated only by a few miles from Lake Nipissing; the Petawawa, 160 m. long, which enters the Ottawa about 220 m. above its mouth; the Bonnetière, 110 m. long, 50 m. above the city of Ottawa; the Madawaska, 250 m. long, some miles lower down; below this the Mississippi, 100 m. long; the Rideau, which enters the main stream at Ottawa; and the South Petite Nation, 100 m. long, below that city. The principal river emptying into Lake Ontario is the Trent (called above Rice lake the Otonabee), which after a tortuous course enters the bay of Quinté; it is navigable for a considerable distance by steamers. Grand river empties into the E. end of Lake Erie, after a S. E. course of about 130 m., 70 m. of which are navigable by small craft. The Thames (navigable to Chatham, 18 m.) discharges into Lake St. Clair after a S. W. course of 160 m. The principal streams that discharge direct into Lake Huron are the Maitland and Saugeen. The chief affluents of Georgian bay are the Nottawasaga river, emptying into the bay of the same name; the Severn, discharging at the S. E. extremity of Matchedash bay; the Muskoka, a few miles N.; the Maganetawan, 100 m. long, N. of this; and French river, at the N. end of the main bay. French river is 50 or 60 m. long, and discharges the waters of Lake Nipissing; it has several mouths, and is little else than a continuous chain of long narrow lakes, connected by rapids or falls. N. of French river are successively the Wahnapietæ and White Fish rivers, the former the outlet of Wahnapietæping lake; and beyond these, and emptying into the North channel, are Spanish, Serpent, Mississagui, and Thessalon rivers, the last near the entrance of St. Mary's strait. Spanish river is navigable by small craft for 35 m. Lake Superior receives among other streams the

Michipicoten, emptying into the bay of the same name; the Pic, into the N. E. extremity of the lake; the Nipigon, into Nipigon bay; the Black Sturgeon, into Black bay; and the Kaministiquia, into Thunder bay. The principal falls are those of Niagara, the Chaudière falls in the Ottawa just above the city of Ottawa, and the falls of Kakabika or Cleft Rock in the Kaministiquia, about 30 m. above its mouth. The Kaministiquia here contracts to the width of about 50 yards, and is precipitated down a perpendicular precipice more than 130 ft. high into a deep chasm. The river banks for nearly half a mile below rise perpendicularly, and in many places overhang their bases. For about 20 m. below the falls the river forms a continued rapid. There are numerous lakes. From Lake Ontario N. between the Ottawa and Georgian bay, and thence around Lake Superior, the country is studded with them, most of the streams consisting of little else than chains of lakes. Just N. of Lake Ontario, in Peterborough and Victoria cos., is a series of them, which discharge through the river Trent. The largest lakes of the province are Simcoe, 30 by 18 m., S. E. of Georgian bay, into which it discharges through the Severn river; Muskoka, 15 by 8 m., N. of Simcoe and discharging through the Muskoka river; Nipissing, 50 by 15 m.; and Nipigon, 70 by 50 m., discharging through the river and bay of the same name into the N. extremity of Lake Superior. The watershed of Nipigon lake forms the N. extremity of the province. Lake Temiscamingue, on the Quebec border (about lat. 47° 30', lon. 79° 30'), is an expansion of the Ottawa river, at the point where it changes from a W. to a S. E. course.—The geological formations that occur in the province are the Laurentian, Huronian, Silurian, and Devonian. The region N. of Lakes Huron and Superior is mostly occupied by the lower Laurentian. The shore and islands of the latter, however, from Pigeon river E. to Nipigon bay, consist of the Quebec group of the lower Silurian, while an area of the Huronian occurs in the N. E. angle of Lake Superior. A belt of the Huronian also stretches along the North channel from St. Mary's strait to the N. extremity of Georgian bay, whence it runs N. E. to Lake Temiscamingue. S. E. of this belt the region between the Ottawa river and Georgian bay is occupied by the lower Laurentian, which extends to the St. Lawrence at the Thousand islands. The E. extremity of the province is occupied by the Quebec and Trenton groups of the lower Silurian, which are separated from the lower Laurentian on the west by an irregular line drawn from the St. Lawrence below the Thousand islands to the Ottawa about 25 m. above Ottawa city. The S. W. limit of the lower Laurentian is a line from Kingston to the head of Matchedash bay. The country S. and W. of this line is occupied in succession by belts of the lower, middle, and upper Silurian formations, and of the Devonian. These

belts have a general E. and W. or S. E. and N. W. direction. The middle Silurian extends through the peninsula of Cabot's head and the Manitoulin islands, in which the lower Silurian also appears. The mineral wealth of Ontario has been but little developed. Iron is found in large quantities in the region between Georgian bay and the Ottawa, a short distance back from Lake Ontario; and in the same district occur copper, lead, plumbago, antimony, arsenic, manganese, heavy spar, calc spar, gypsum, marble, and building stone. Gold has been found here, but not in paying quantities, and mica is profitably worked. Building stones also occur in the S. W. part of the province, where there are apparently inexhaustible petroleum wells. There are productive salt wells on the E. shore of Lake Huron S. of Georgian bay. Large beds of peat exist in various localities, and two companies are engaged in its manufacture into fuel. Apatite or phosphate of lime is obtained in considerable quantities in the E. part of the province. Iron mines have been opened in several places, the principal of which are at Marmora in Hastings co., yielding from 20,000 to 30,000 tons of ore annually. Gold mines have been opened at Marmora, but have not yet been profitably worked. N. of Lake Huron, near the entrance of St. Mary's strait, are the Bruce copper mines; the ore yields 19 per cent. of copper. The product of ore for four years has been as follows: 1869, 2,180 tons; 1870, 1,945; 1871, 1,852; 1872, 1,214, besides 243 tons of copper precipitate yielding 64 per cent. of copper. Silver is found on the shores of Lake Superior, particularly in the vicinity of Thunder bay, Silver islet in that bay containing one of the richest veins of the metal ever discovered. Mining operations were commenced on the islet about 1870, and the yield to the close of navigation in 1872 was \$1,232,438 79, of which \$648,132 01 was produced in 1871 and \$469,038 20 in 1872. The quantity of petroleum produced during the three years ending June 30, 1873, was as follows:

YEARS.	Number of refiners.	Crude oil used, gallons.	Refined oil produced, gallons.
1871.....	50	17,711,513	11,628,429
1872.....	45	19,682,181	12,209,182
1873.....	88	25,073,725	14,520,196

—The climate is healthy. The winters are cold, and the heat in summer is occasionally severe. The S. W. portion has the mildest climate, while in the region N. of Lakes Huron and Superior the summers are short and the winters long and severe. The following table gives the most important results of meteorological observations for 33 years at Toronto (lat. 43° 39'), and for different periods at Windsor (lat. 42° 20') on the Detroit river, at Pembroke (lat. 45° 50') on the Ottawa, at Little Current (lat. 46°) on Grand Manitoulin island, and at Fort William (lat. 48° 23') on Thunder bay:

LOCALITY.	AVERAGE MEAN TEMPERATURE.					Highest temperature.	Lowest temperature.	Average annual precipitation of rain and melted snow.
	Year.	Autumn.	Winter.	Spring.	Summer.			
Windsor.....	47·3°	49·4°	24·8°	44·7°	70·2°	98·8°	—21°	31·72 in.
Toronto.....	44·1	46·8	16·8	40·7	65·1	99·2	—26½	36·09 "
Pembroke.....	40·5	43·6	15·5	38·8	67·5	99·9	—45	28·38 "
Little Current.....	39·6	44·5	18·5	35·0	65·5	88·9	—85	29·37 "
Fort William.....	35·7	37·8	10·7	34·8	59·9	.....	....	39·40 "

—Agriculture is the chief occupation of the inhabitants. The soil varies in different localities, a large proportion being of excellent quality. The S. W. peninsula has been justly regarded as the garden of Canada, the influence of the surrounding bodies of water harmonizing with the natural richness of the soil. Wheat is the staple crop of the province, and large quantities are produced. Oats, barley, rye, potatoes, turnips, and Indian corn are also grown, but the last is not profitably cultivated, except in the S. and S. W. parts, the climate elsewhere being too cold. In the southwest the peach ripens and grows well, and the apple orchards of this district are very productive. Pears, plums, grapes, cherries, and various kinds of berries thrive. The extensive district lying between the Ottawa river and Georgian bay contains large tracts of fertile land, and produces a great variety of timber. This district has been distinguished into white pine and red pine and hard wood countries, owing to the prevalence in different places of those different descriptions of timber. The white pine country lies to the east, and the red pine immediately W. of it. The soil of the red pine country is sandy and poor, gravelly or stony, with a rugged, uneven, and rocky surface. The other division contains a mixture of good and tolerable land, generally fit for agricultural purposes. Excepting where tracts of hard wood land occur at intervals, the red pine country is pronounced, on official authority, unfit for settlement. W. of these two divisions lies the hard wood country. Among the timber which gives its name to this section are interspersed belts of red pine, the white having totally disappeared. This strip extends W. at one point 75 m., and has a length of 130 m. from S. E. to N. W. Between this strip and Georgian bay lies a belt from 20 to 30 m. in breadth of barren soil, frequently terminating in naked rock near the shores of the bay. To the south, near the ridge dividing the waters of the Ottawa from those which flow directly into the St. Lawrence, belts of poor, rugged, stony land, about 20 m. in width and unfit for settlement, occur. N. and W. of Lake Nipissing the land is good, but on the French river it is rocky and barren. In the district between the Ottawa and Georgian bay lumbering is extensively carried on. In the westernmost section of the province, N. of Lakes Huron and Superior, the timber, consisting chiefly of spruce, balsam fir, white birch, poplar, and cedar, is generally of little commercial value. Some of the higher points are

bare of trees, and the land available for agricultural purposes is chiefly confined to the flats and valleys at the mouths of the streams. Between the Batchewanaing and Goulais bays and the Missisagui river, in the rear of the village of Sault Ste. Marie, the country is fine, producing hard wood on the ridges, and presenting in the broad, alternating flats a deep alluvial soil. Among the hard wood there is a sufficiency of white pine for building purposes; the flats are principally covered with cedar, tamarack, ash, elm, soft maple, and birch, except where small prairies, bearing a luxuriant growth of grass, intervene. The whole country, where it has been surveyed and explored, from Lake Superior to Lake Nipissing, presents, among the rugged and broken portions that intervene, many extensive valleys of excellent land, well adapted for settlement. And even in the more rugged and less prolific portions groves of fine pine timber are frequently met, and indications of mineral wealth present themselves. The valley of the Spanish river presents important facilities for settlement, all the land being of good quality or bearing a rich crop of excellent pine. In the region N. of Lake Superior it is believed that oats, barley, hay, potatoes, the ordinary vegetables, and in places wheat, may be successfully cultivated. In the vicinity of Lake Nipigon there is much good land, and the climate appears to be as well suited to agriculture as that of the greater part of the province of Quebec. The timber here consists chiefly of white spruce, white birch, aspen, poplar, balsam fir, tamarack, and white cedar, with occasional trees of black ash, gray elm, and white pine.—The wild animals, except the smaller species, have mostly disappeared in the S. portions of the province. Domestic animals, horses, cattle, sheep, and swine, are extensively raised. In the north and west fur-bearing animals are still trapped by the Indians, and the Hudson Bay company has several posts there. The great lakes, as well as many of the smaller ones and many of the streams, abound in fish. The value of the catch for the year ending June 30, 1874, was \$446,267 50, consisting chiefly of whitefish, with some trout, herring, and other species. Fourteen vessels, 804 boats, and 2,195 men were employed.—Water power is abundant, but manufactures, though increasing, are yet comparatively undeveloped, while many of the establishments already in operation use steam power. The principal articles manufactured are cotton and woollen goods, linen, furniture, lumber,

hardware, paper, soap, starch, hats and caps, boots and shoes, leather, steam engines, sewing machines, &c. (For industrial statistics, see APPENDIX to this volume.)—The value of exports to foreign countries for the year ending June 30, 1874, was \$25,157,087, viz.: produce of mines, \$1,135,418; of the fisheries, \$78,597; of the forest, \$7,322,811; animals and their products, \$4,742,020; agricultural produce, \$7,573,157; manufactures, \$528,451; the rest miscellaneous, including goods not the produce of Canada. Of the whole amount, \$2,132,786 was to Great Britain and \$19,728,081 to the United States. The value of imports from foreign countries for the same period was \$49,443,977; of goods entered for home consumption, \$48,476,357, of which \$15,386,224 was from Great Britain and \$31,694,999 from the United States. The principal items of im-

port are sugar, tea, coal, Indian corn, wheat, hogs, iron and iron manufactures, locomotives and railroad cars, cottons, woollens, fancy goods, and other manufactured articles. The number of entrances from the United States (with which country alone the direct foreign commerce is carried on) for the above mentioned year was 13,753, with an aggregate tonnage of 2,516,927; clearances for the United States, 13,979, tonnage 2,325,717; built during the year, 77 vessels, tonnage 15,478. The number of vessels belonging in the province at the close of 1873 was 681, with an aggregate tonnage of 89,111.—The railroad system of the province has been rapidly extended during the past ten years, and now connects the principal points with each other, and with the United States and the province of Quebec. In 1874 there were 2,404 m. of railway, as follows:

LINES.	TERMINI.		Miles in operation in the province.
	From	To	
Brockville and Ottawa	Brockville.....	Carleton Place.....	47
Perth branch.....	Smith's Falls.....	Perth.....	12
Canada Central.....	Ottawa.....	Renfrew.....	71
Canada Southern.....	Victoria.....	Amherstburg.....	229
Erie and Niagara branch.....	Niagara.....	Fort Erie.....	31
Cobourg, Peterborough, and Marmora.....	Cobourg.....	Harwood.....	14
Grand Trunk (W. division).....	Montreal, Quebec.....	Detroit, Mich. (564 m.).....	458
London branch.....	St. Mary's.....	London.....	23
Buffalo division.....	Fort Erie, opposite Buffalo, N. Y.....	Goderich.....	158
Great Western.....	Clifton, on Niagara river.....	Windsor, opposite Detroit.....	229
Toronto branch.....	Hamilton.....	Toronto, opposite Detroit.....	39
Sarnia branch.....	Komoka.....	Sarnia.....	50
Canada air line.....	Fort Erie.....	Glencoe (150 m.); completed to St. Thomas.....	122½
Petrolia branch.....	Wyoming.....	Petrolia.....	6
Brantford branch.....	Harrisburg.....	Brantford.....	8
Allanburg branch.....	Clifton.....	Allanburg, on Welland railway.....	9
Hamilton and Lake Erie.....	Hamilton.....	Jarvis.....	31
Kingston and Pembroke.....	Kingston.....	Pembroke (120 m.); completed to Harrowsmith.....	18
London and Port Stanley.....	London.....	Port Stanley.....	24
Midland.....	Port Hope.....	Orillia.....	87
Peterborough branch.....	Millbrook.....	Lakefield.....	22
Northern.....	Toronto.....	Meaford.....	115
Muskoka branch.....	Allendale.....	Orillia.....	23
St. Lawrence and Ottawa.....	Prescott.....	Ottawa.....	54
Toronto and Nipissing.....	Toronto.....	Lake Nipissing (240 m.); completed to Cobocank or Shedden.....	88
Toronto, Grey, and Bruce.....	Toronto.....	Teeswater.....	122
Owen Sound branch.....	Orangeville.....	Owen Sound.....	74
Welland.....	Port Dalhousie.....	Port Colborne.....	25
Wellington, Grey, and Bruce.....	Harrisburg.....	Southampton.....	129
South extension.....	Palmerston.....	Kincardine.....	66½
Whitby and Port Perry.....	Whitby Junction.....	Port Perry.....	19

There are a number of other lines projected or in progress. The principal canals are the Welland, 28 m. long, from Port Dalhousie to Port Colborne; and the Rideau, from Kingston to Ottawa, 126 m. long, including the Cataraqui and Rideau rivers. There are also a number of short canals around rapids in the St. Lawrence and Ottawa rivers. Nine banks were reported on Sept. 30, 1874, with a paid-up capital of \$14,554,962, besides which there are numerous branches of banks of the province of Quebec.—The government is administered by a lieutenant governor, appointed by the governor general of the Dominion in council for five years, assisted by an executive council of five members (attorney general, commissioner of

agriculture and secretary and registrar, treasurer, commissioner of crown lands, and commissioner of public works), appointed by himself and responsible to the assembly. The legislative authority is vested in a single chamber, styled the house of assembly, consisting of 88 members elected by the qualified voters by districts for four years. Voting is by ballot, and the right of suffrage is conferred on all male British subjects 21 years of age, possessed of a small property qualification. The judicial power is vested in a court of error and appeal, a court of queen's bench, a court of common pleas, a court of chancery, county courts, and division courts. The first consists of a chief justice and six judges, and has

appellate jurisdiction of judgments of the queen's bench, common pleas, and chancery courts. The queen's bench and common pleas each consist of a chief justice and two puisne judges, and have concurrently with each other general original jurisdiction in criminal cases and in civil cases at common law, and appellate jurisdiction of judgments of the county courts. The court of chancery consists of a chancellor and two vice chancellors, and has general original jurisdiction in equity. The judges of the courts named are appointed by the governor general of the Dominion in council for life. A county judge is appointed by the lieutenant governor for each county or union of counties, who holds a county court with jurisdiction of certain civil actions not involving more than £50 or £100, according to the nature of the case; a court of general sessions, with jurisdiction of offences not capital; and a surrogate court, with probate powers. Each county or judicial district is divided into court divisions for division court purposes. These courts are held by a county judge or other magistrate, and make summary disposition of cases not involving more than £10 or £25 according to the nature of the suit. Ontario is represented in the Dominion parliament by 24 senators and 88 members of the house of commons. The balance in the provincial treasury on Jan. 1, 1874, was \$277,948 05; receipts during the following nine months, \$2,413,228 89, including \$1,333,569 42 subsidy from the Dominion government; amount withdrawn from special deposit, \$1,253,380 92; total amount in treasury during the period, \$3,944,557 86; total payments, \$2,558,887 81; invested (special deposits), \$1,200,000; balance in treasury Sept. 30, 1874, \$185,670 05. The following were some of the more important items of expenditure: for the civil government, \$117,244 49; legislation, \$108,910 76; colonization roads, \$52,804 15; administration of justice, \$145,792 25; public buildings, \$229,043 41; maintenance of public institutions, \$198,166 91; agriculture, arts, &c., \$74,356 24; immigration, \$74,162 83; hospitals and charities, \$43,020; education, \$418,403 65; public works, \$74,400 54.—The charitable and correctional institutions controlled by or receiving aid from the province are placed under the supervision of a government inspector. The provincial institutions are the insane asylums at London and Toronto, the former having a custodial department for idiots and a department for the chronic insane; the institution for the education of the deaf and dumb, at Belleville; the institution for the education of the blind, at Brantford; the central prison, at Toronto; and the provincial reformatory for boys, at Penetanguishene. The central prison, opened on June 1, 1874, is designed for the incarceration of persons convicted of the graver class of misdemeanors; the labor of the prisoners is leased to the Canada car company. There is a penitentiary at Kingston under the control of the

Dominion, in which convicted felons are incarcerated; number of convicts at the close of 1873, 384. The Rockwood insane asylum at Kingston is under the control of the Dominion; it is used for the custody of insane convicts, but the greater number of its inmates are not convicts, being insane persons received from Ontario and supported at the expense of that province. A provincial inebriate asylum was provided for by an act of 1873, and buildings are (1875) in course of construction at Hamilton. There are a few paying patients in the insane asylum and pupils in the deaf and dumb and blind institutions, but far the greater number are supported at the public expense. The inspector in his last annual report recommends the establishment of a training school for idiots and an industrial reformatory for women. The statistics of the institutions controlled or aided by the province for the year ending Sept. 30, 1874, are as follows:

INSTITUTIONS.	Number in institution during year.	Remaining at close of year.	Amount expended by the province.
Toronto insane asylum....	765	640	\$80,217 60
London insane asylum....	694	602	81,896 11
Kingston insane asylum....	403*	357*	52,195 00
Deaf and dumb institution. ....	...	190	32,276 42
Blind institution.....	...	101	22,531 08
Central prison.....	870	275	17,786 38
Provincial reformatory....	188	189	19,889 58
Common jails (38).....	9,488	594	129,334 54†
Hospitals (10).....	3,587	362	29,080 00
Orphan asylums (11).....	1,516	881	13,940 00
Newsboys' lodging house, Toronto.....	125	14	
Magdalen asylums (2).....	195	100	
Poorhouses (4).....	792	272	
Total.....	18,126	4,625	\$479,146 71

There were 21 insane convicts at the close of the year in the Kingston asylum, and 55 insane persons in jails. The number of persons receiving outdoor treatment or relief from the hospitals during the year was 9,184. The receipts from the institutions under provincial control amounted to \$37,448 15.—The province has an excellent system of free public schools, under the general management of a chief superintendent of education and three high school inspectors for the province, 77 public school inspectors in the different cities and towns, and counties or divisions of counties, and boards of trustees for the various school sections or districts. Besides these, which are unsectarian, there are Roman Catholic separate schools, which receive aid from the provincial treasury. The school law provides for the establishment and maintenance of three classes of superior schools, viz.: classical and English high schools for both sexes; English high schools for both sexes; and collegiate institutes, in which there shall be an average daily attendance of at least 60 boys in Greek and Latin. The public schools are open to all between the ages of 5 and 21

* Number supported by the province.

† More than half this sum was paid by the counties.

years, and children between 7 and 12 years of age are required to attend some school during a portion of the year. An annual census of those between 5 and 16 is taken. The following table contains statistics of the educational institutions of the province for 1873:

INSTITUTIONS.	Number.	Teachers.	Pupils.	RECEIPTS.			
				Legislative grants.	County and district assessments and grants.	Other sources.	Total.
High schools.....	108	252	8,497	\$77,464 29	\$96,650 69	\$59,426 40	\$233,541 38
Normal and model schools.....	3		800	25,156 78		.....	25,156 78
Public schools (ordinary grade).....	4,562	5,373	438,911	} 245,873 73	2,040,742 87	680,748 55	2,967,865 15
Roman Catholic separate schools	170	269	22,073				
Colleges and universities.....	16		2,700	160,000 00		57,000 00	217,000 00
Academies and private schools	265	429	8,758	.....		40,626 00	40,626 00
Total.....	5,124	6,323	481,679	\$508,494 80	\$2,187,398 56	\$887,800 95	\$8,488,689 31

The separate receipts of the Roman Catholic schools amounted to \$83,269 87, of which \$13,358 07 was derived from legislative grants, \$47,167 43 from school rates on supporters, and \$22,744 37 from other sources. Of the teachers (5,642) in the public and separate schools, 2,581 were males and 3,061 females; of the pupils (460,984), 242,615 were males and 218,369 females; average attendance, 192,-190; average time of keeping schools open (including legal holidays), 11½ months. The number of school sections or districts was 4,805; number of school houses, 4,791 (1,132 brick, 463 stone, 2,083 frame, and 1,112 log); number of children between 5 and 16 years of age, 504,869. Eight of the high schools were entitled to the name and privileges of collegiate institutes. The total amount expended for educational purposes in the province was \$3,-258,125, viz.: for public and separate schools, \$2,604,526, of which \$1,520,123 was for teachers' wages and \$1,084,403 for the erection and repair of school houses, &c.; for high schools, \$198,297, of which \$165,358 was for teachers' wages and \$32,939 for the erection and repair of buildings, &c.; and for other educational institutions and purposes, \$455,-302. The provincial normal school and the model schools mentioned in the table are at Toronto. A second normal school has recently been opened at Ottawa. The provincial school of agriculture was opened in 1874, on a farm of 550 acres, about a mile from Guelph. It comprises seven departments: agriculture, horticulture, natural sciences, chemistry, animal anatomy and physiology, English and mathematics, and practical work in farming, stock raising, horticulture, and mechanics. There are a principal and four lecturers in the first six departments, and six instructors in the seventh. The course is two years. The establishment of a provincial school of practical science for instruction in mining, engineering, and the mechanical and manufacturing arts at Toronto was provided for by an act of 1873. One of the principal educational institutions is University college (provincial) at Toronto, with a course in arts and two years' courses in civil engineering and agriculture. In 1873-'4 it had 15 instructors and 186 matriculated

and 82 non-matriculated students. It was established by royal charter as King's college in 1827, and opened in 1843. In 1850 the name was changed to university of Toronto, and in 1853 the institution was divided into the University college and the university of Toronto, the latter merely holding examinations and conferring degrees. It has faculties of arts, law, and medicine. Other universities are Queen's (Presbyterian), with faculties of arts, medicine, and theology, at Kingston; Trinity (Episcopal), arts, medicine, and theology, at Toronto; Victoria (Methodist), arts, law, and theology, at Cobourg, and medicine at Toronto; Albert (Methodist Episcopal), arts, law, and theology, at Belleville; and the college of Ottawa (Roman Catholic), at Ottawa, with university powers. Knox college (Presbyterian) at Toronto, and Huron college (Episcopal) at London, are chiefly for theological instruction. Assumption college (Roman Catholic) at Sandwich, Bishop Hellmuth college and Bishop Hellmuth ladies' college (Episcopal) at London, Upper Canada college at Toronto, the Wesleyan female college at Hamilton, and Alexandra female college (M. E.) at Belleville, are important institutions. The Canadian literary institute (Baptist), at Woodstock, has literary and theological departments. In 1873 there were 4,182 public libraries, with 755,302 volumes, of which 1,283, with 258,879 volumes, were free libraries, under the management of school trustees and municipal authorities, receiving some aid from the provincial treasury; 2,735, with 367,658 volumes, Sabbath school; and 164, with 128,765 volumes, miscellaneous. In 1874 there were 255 newspapers and periodicals, viz.: 23 daily, 1 tri-weekly, 1 semi-weekly, 212 weekly, 1 bi-weekly, 16 monthly, and 1 bi-monthly.—The statistics of the principal religious denominations, according to the census of 1871, are as follows:

DENOMINATIONS.	Churches.	Buildings attached.	Adherents.
Baptist.....	279	861	86,680
Episcopal.....	511	708	380,995
Methodist.....	1,924	2,646	462,264
Presbyterian.....	697	989	356,442
Roman Catholic.....	293	458	274,162
Other.....	389	491	110,358
Total.....	4,093	5,648	1,620,851

Of the Baptists, 10,231 were Freewill Baptists and 11,438 Tunkers; of the Methodists, 286,911 were Wesleyans, 92,198 Episcopal, 24,045 Primitive, 30,889 New Connection, and 18,225 Bible Christians; of the Presbyterians, 63,167 were connected with the church of Scotland. Among denominations not named in the table were Adventists, 1,449; Christian Brethren, 1,513; Plymouth Brethren, 1,689; Christian Conference, 11,881; Congregationalists, 12,858; Evangelical Association, 4,522; Quakers, 7,106; Swedenborgians, 779; Unitarians, 1,088; Universalists, 1,722.—The French penetrated this region in the early part of the 17th century, and established some trading posts; but it did not begin to be permanently settled till toward the close of the 18th century. In 1763, with the rest of Canada, it passed into the hands of the British. In 1774 the newly acquired territory was organized as the province of Quebec. In 1791 it was divided into two provinces, Upper Canada and Lower Canada, and in 1841 these were reunited as the province of Canada. Upon the organization of the Dominion of Canada in 1867, they were again separated, and Upper Canada became the province of Ontario. An elective assembly was granted to the provinces in 1791, and in 1841 responsible government was introduced. The only important disturbances of the peace of the province have been the war of 1812 between Great Britain and the United States and the Canadian rebellion of 1837.—See "Geological Survey of Canada: Report of Progress from its Commencement to 1863" (Montreal, 1863; with atlas, Montreal, 1865).

ONTARIO, a county of the province of Ontario, Canada, on the N. shore of Lake Ontario; area, 859 sq. m.; pop. in 1871, 45,890, of whom 19,290 were of English, 12,098 of Irish, 9,976 of Scotch, 1,723 of German, and 1,418 of Dutch origin or descent. It is bounded N. W. by Lake Simcoe, and is watered by several small streams. It is traversed by the Grand Trunk, the Toronto and Nipissing, the Midland, and the Whitby and Port Perry railways. Capital, Whitby.

ONTARIO, Lake, the lowest and smallest of the chain of five great lakes of the northern United States and Canada. The name is Indian, meaning beautiful. The lake extends E. and W. about 180 m., having a mean breadth of 35 m., and a depth supposed to average about 500 ft. The elevation of its surface above tide being 231 ft., its bottom is about as far below the level of the ocean as its surface is above it. The area of the lake is computed at 6,300 sq. m., 3,300 sq. m. less than that of Lake Erie, the next larger lake. The boundary line between the United States and Canada runs through the central portion of Lake Ontario, from the mouth of the Niagara river to the outlet in the extreme N. E. corner. This is the St. Lawrence river, which, commencing at this point, pursues a course of nearly 800 m. to

the gulf of St. Lawrence. From the head of the river the coast of Lake Ontario on its E. and S. sides as far as Niagara river belongs to the state of New York; thence 50 m. further W. along the S. coast, and E. along the N. side to the St. Lawrence river, the lake is bounded by Ontario, Canada. By reason of its great depth Lake Ontario is much less disturbed by storms than Lake Erie, and its navigation is also much less obstructed by ice. In the severest winters the boats continue their trips across, and are rarely interrupted by ice. When once chilled, the water slowly recovers a warmer temperature; and even in the middle of May for two successive years, 1837 and 1838, it has been found that the temperature of the water a little below the surface in the central portion of the lake was only from 36° to 38°, while near the American shore it was from 52° to 68°, and at the same times at Cobourg on the Canadian side from 48° to 51°. Prof. C. Dewey, by whom these observations are recorded in the "American Journal of Science," supposed that the accumulation of ice in Lake Erie, which frequently does not disappear till some time in May, serves to retain the low temperature of the water, particularly along the course of the main current through the central part of Lake Ontario. The effect of this is to retard the approach of spring; but opposite causes operate in the autumn to check the advance of winter. The same observer has recorded the measures of the varying level of the lake from the year 1845 to 1859, made at the mouth of the Genesee by order of the government. From these it appears that there is no periodical rise and fall, and the variations are dependent on very regular and adequate causes of supply and drain. The range of rise and fall is 54 inches, the maximum elevation during the years of the observation being in February and the minimum in August. The effect of long continued rains or of long droughts in certain years is observed in the occurrence of the highest or lowest water out of the usual seasons.—The country around Lake Ontario is in general fertile and well populated by agricultural, manufacturing, and commercial communities. On the N. side the surface rises gradually from the lake shore and spreads out in broad plains. From the St. Lawrence river two thirds of the way to the W. extremity of the lake these are underlain by the lower Silurian limestones, from which the soil derives its fertility. These rocks near Toronto pass beneath the group of the Hudson river slates, and these then occupy the surface nearly to Burlington. The red shales and sandstones of the Medina group succeed, and a narrow belt of this formation borders the lake on its W. and S. sides. At Oswego the lower formations begin to reappear, and their outcrops are successively passed over along the E. extremity of the lake. The formations which underlie the lake and form its bottom, over the N. half at least, are no doubt these lower limestones slo-

ping southwardly from the N. shore. A marked feature in the topography of the S. shore is the "Lake ridge," a narrow elevation ranging from Sodus in Wayne co. to the Niagara river, nearly parallel with the edge of the lake, and at a distance of from 3 to 8 m. from it. Its elevation is in places nearly 200 ft. above the lake, and generally exceeds 160 ft. The surface on each side slopes away gradually, so that the line of the ridge is not everywhere distinctly defined. In other places it is plainly marked, having a base from 56 to 112 ft. across, and a width at the summit of about 33 ft. Sometimes it is divided into three or four parallel ridges, which extend a few rods and then unite in one. Being composed of sand and gravel, it makes one of the finest natural roads in the world, and the principal highway along this side of the lake has been upon its summit. There can be little doubt that this ridge was an ancient shore line, and that within a recent geological period it has been formed by the waters of the lake.—Besides its main feeder, the Niagara river, the principal streams which flow into Lake Ontario are the Genesee, Oswego, and Black rivers. The Oswego is the outlet of almost all the lakes in the western part of New York. On the N. side of Lake Ontario a range of hills extending parallel with the lake and a few miles back from it throws the drainage generally in other directions. The Trent river alone finds a passage through these hills, and flows with a number of smaller streams into the bay of Quinté, a long inlet extending about 70 m. between the peninsula of Prince Edward near the foot of the lake and the mainland. The largest island in the lake, called Amherst island, is at the mouth of this inlet; it is 10 m. long and 6 broad. Many other smaller islands are met with at this lower extremity of the lake; but excepting in this part the coast is very regular and unbroken. The principal towns in New York on the lake, or near the mouths of the streams which flow into it, are Lewiston on the Niagara river, Rochester on the Genesee, Oswego at the mouth of the Oswego river, and Sackett's Harbor near the foot of the lake. In Canada, Kingston at the foot of the lake, Toronto 35 m. from its head, and Hamilton at the extreme head, are the largest towns on its shore. Its navigation is connected with that of Lake Erie by the Welland canal of Canada, 28 m. long.

ONTOLOGY. See PHILOSOPHY.

ONTONAGON, the extreme N. W. county of Michigan, bounded N. W. by Lake Superior, and S. W. by Wisconsin, from which it is separated in part by the Montreal river, and drained by the Ontonagon, Fire Steel, Iron, Presque Isle, and Black rivers; area, about 2,300 sq. m.; pop. in 1870, 2,845. The surface is hilly, and an elevated range called the Porcupine mountains traverses the northern portion. It contains large quantities of copper and iron ore. In 1870 there were 10 copper mines

worked, the products of which amounted to \$256,802. The product in 1872 was 725½ tons of ore. Capital, Ontonagon.

ONYX, a variety of quartz, analogous to agate and other cryptocrystalline varieties, such as carnelian, jasper, chrysoprase, and bloodstone. It is composed of layers of different-colored carnelian, much like banded agate in structure, but the layers are in even or parallel planes, and the banding therefore straight; on which account it is well adapted to the cutting of cameos, and was much used for that purpose by the ancients. The colors of the best are perfectly well defined, and are either white and black, or white, brown, and black; the finest specimens are brought from India. Many of the cryptocrystalline varieties of quartz, particularly carnelian, contain variable small portions of opal, a hydrous quartz (see OPAL), which enhances their lustre and value. Sardonyx has a structure like onyx, but is composed usually of alternate layers of white chalcedony and carnelian (sard), although the carnelian may be associated with layers of white, brown, and black chalcedony.

OÖLITE (Gr. *ὄον*, an egg, and *λίθος*, a stone), limestone composed of rounded particles, like the roe or eggs of a fish. Each of the grains has usually a small fragment of sand as a nucleus, around which concentric layers of calcareous matter have accumulated. Ferruginous oörites are also found, as in the Clinton group in the United States, the investing material being in this case red oxide of iron. The name oölite is also applied to a group of strata of the Jurassic period, largely developed in England, in which limestone of this character occurs. The oölitic epoch is embraced between the liassic below and the Wealden above, these three epochs forming the Jurassic period, the middle period of the reptilian age. The oölitic formation contains limestones, part of which are oölitic in texture, and others arenaceous and clayey, all being of marine origin except the Purbeck beds which rest upon the upper or Portland oölite. The following subdivisions are recognized: 1. Lower or Bath oölite, containing, among other groups, fuller's earth and the great oölitic limestone, beneath which are the Stonesfield slates, near Oxford, noted for the remains of saurians, insects, and the earliest British mammals. There is also in the lower oölite in Sutherlandshire a bed of good coal 3½ ft. thick, which has been worked for a long time. 2. Middle oölite, containing calcareous grits with Oxford clay between. 3. Upper oölite, containing Kimmeridge clay, which furnishes material for Portland cement. 4. The Purbeck beds, consisting of lower, middle, and upper Purbeck, which contain freshwater marls, the "Portland dirt bed" being in the lower, and containing the second deposit of British mammals.

OORT, Adam van, a Flemish painter, born in Antwerp in 1557, died there in 1641. He was instructed by his father, a painter of history,

and had a school in Antwerp, where Rubens and Jordaens were instructed, the latter becoming his son-in-law. He was intemperate, brutal, and avaricious.

OPAL, a mineral composed principally of silicic acid combined with from 5 to 13 per cent. of water. The finest varieties have the most delicately resplendent play of iridescent colors, with a peculiar vitreous, sometimes resinous and pearly lustre. It is softer than quartz, the hardness ranging from 5.5 to 6.5; specific gravity 1.9 to 2.3. The varieties pass into one another, so that it is difficult to classify those which form the transitions. Dana gives the following: 1. Precious opal, spoken of by Pliny as presenting various refulgent tints in succession, now one hue and now another. The specimens are rarely larger than a hazel nut; there is one in the Vienna museum the size of a man's fist, weighing 17 oz., but having many fissures. 2. Fire opal, of a hyacinth red to honey yellow, with fire-like reflections. 3. Girasol, bluish white, translucent, with reddish reflections of bright light. 4. Common opal, including among other kinds resin opal, semi-opal, hydrophane (which becomes translucent or transparent in water, whence its name, though this is a common quality of opal), and forcherite (orange yellow, colored by orpiment, from Reittelfeld in Upper Styria). 5. Cacho-long (*Kascholong*, *Perlmutter*), opaque, bluish white and reddish, adhering to the tongue, containing a little alumina. 6. Opal agate. 7. Menilite (*Leberopal*). 8. Jasper opal (*Eisenopal*), containing yellow oxide of iron, and having the color of yellow jasper. 9. Wood opal, consisting of wood petrified by opal. 10. Hyalite, clear as glass and colorless, constituting globular concretions, also crusts with uniform surface, passing into translucent. 11. Fiorite, silicious sinter, occurring in tufa, in the vicinity of Santa Fiora, Italy, and at the *solfatara* near Naples, in globular and stalactitic concretions, resembling hyalite, but pearly in lustre. Thomson mentions a similar incrustation formed from the hot waters of the Sasso lagoons. Another variety of fiorite is michaelite, from the island of St. Michael, one of the Azores, where it is found in snow-white incrustations, capillary in structure and pearly in lustre; also geyserite, from the Iceland geysers, having porous, stalactitic, cauliflower-like forms. 12. Float stone (*Schwimmstein*), in light, tuberoso, spongy masses, floating on water, sometimes having a flint-like nucleus. 13. Tripolite, an earthy variety of opal, formed from the silicious shells of diatoms and other microscopic species, discovered by Ehrenberg, and occurring in deposits often many miles in area, containing several sub-varieties, some uncompact and some moderately hard.—The precious opal was known to the ancients, and ranked among the most valuable gems. Pliny describes it under the name of *opalus*, and in the Orphic hymns it is spoken of as the *ὀπάλλιος*, and again as *παιδέρως* in allusion to

the delicacy of its complexion, like that of a child, *παῖς*. Fine specimens of precious opal are still valued as gems. Opal in some of its varieties is not rare. It occurs in veins in porphyry, sometimes associated with galena and blende, and again in vesicular cavities in amygdaloidal rocks, sometimes in limestone and clay slate, and even as the material replacing the organic matter of fossils. It is obtained in various parts of the world. Mines have been worked for it in Hungary, in the county of Sáros, for several centuries, and the precious opal extracted and taken away by Grecian and Turkish merchants has, it is said, found its way by the Indies to Holland under the name of oriental opal. The same variety is also brought from Honduras and Nicaragua. The fire opal is found in the Faroe islands, Guatemala, Zimapan in Mexico, Washington co., Ga., and various other places. Humboldt brought from Mexico the first specimens of it seen in Europe. It is too rare to be employed like the precious opal in jewelry. The latter is used for rings, necklaces, and other ornaments, usually in oval or lens form, and to best advantage in a black setting. The edges of the stone on account of its softness are easily injured, and it must therefore be used with care. Very fine jewels are sometimes protected by a thin plate of quartz crystal. Changeable red and green colors are the most highly valued. Some opals are rated at very high prices, as one at £4,000 from Hungary in the great exhibition of 1851, which weighed 526½ carats. Two belonging to the crown jewels of France cost 75,000 francs. Specimens imported into the United States are valued by dealers at \$4 to \$10 a carat. Some of the finest are from Gracias á Dios, Honduras. Wood opal is named from its peculiar ligneous structure, and occurs in the form of trees in trappean rocks. Its localities are Hungary, France, Iceland, Greenland, Maryland, Pennsylvania, and Colorado.

OPATAS, a tribe of Indians, occupying the eastern and southern part of the state of Sonora, Mexico. They are semi-civilized, but maintain their independence of the state government, with which nevertheless they are on good terms, and often lend assistance against the Apaches. Their chief residence is on the rivers Yaqui and Mayo, by which names they are commonly known. Their number is estimated at 30,000.

OPELOUSAS, a town and the capital of St. Landry parish, Louisiana, 180 m. W. N. W. of New Orleans; pop. in 1870, 1,546, of whom 666 were colored. It is situated in the midst of a fertile and picturesque country, and has considerable trade. A weekly newspaper is published in French and English. Franklin college, founded here in 1839, has been suspended since the civil war.

OPERA, a species of drama in which airs, recitatives, choruses, &c., with orchestral accompaniments and the ordinary stage accessories, supply the place of spoken words. This

is the true opera as found on the Italian stage at the present day, and as performed at the *académie* in Paris; but the term is applied to a class of compositions familiar to the theatres of Germany, France, and England, in which the words are partly spoken, partly sung. The idea of the opera was probably derived from the Greek drama; and it is said to have become a recognized form of dramatic composition as early as the latter half of the 15th century. There is great doubt, however, whether any work entitled to be called an opera was publicly produced previous to the year 1600, when Ottavio Rinuccini's drama of *Euridice*, set to music by Giacomo Peri, was performed in honor of the nuptials of Henry IV. of France and Maria de' Medici; a conclusion strengthened by Rinuccini's statement in his dedication of the work to the queen, that he had written it "merely to make trial of vocal music in that form." The opera soon became a popular species of musical composition in Italy, and about 1675 was established in the chief cities of the peninsula. Monteverde and Carissimi were among the foremost composers of that day. In 1645 it was introduced into France by Cardinal Mazarin, but was soon superseded by the national French opera founded by Louis XIV., and which received its impetus from the genius of Lully and Rameau. This was the parent of the grand French opera of the present day, which is sung throughout. The establishment of the Italian opera in England may be dated from the arrival of Handel and the production of his *Rinaldo* in 1711. Before that time operas had been sung partly in English and partly in Italian, according to the nationality of the performers. Bononcini's *Almahide* was the first opera sung entirely in Italian, and this was brought out in 1720. The opera encountered ridicule and opposition from the wits, from men of letters, and from the people; but it made its way in spite of these obstacles, and from the time when Handel and Porpora composed for the London opera houses to the present day it has maintained itself in England. Great Britain, however, has failed to give to the world any very eminent composer; Balfe and Wallace, both Irishmen, are among the most noted. In Germany it early took root, and to the composers of that nation much of its development is due. Gluck was the first to introduce extensive reforms, and to compose with a view to musical expression rather than the display of the singer. He wrote mainly for the French stage, where after a long contest he was successful over Piccini and his adherents. Among the composers who since the time of Gluck have done most for the operatic stage are Mozart, Meyerbeer, and Von Weber among the Germans; Cimarosa, Cherubini, Spontini, Rossini, Donizetti, Mercadante, Bellini, and Verdi among the Italians; and Boïeldieu, Auber, Halévy, Gounod, and Thomas among the French. Richard Wagner, both by his wri-

tings and his compositions, has done much to modify the theories upon which opera has been constructed heretofore. How far his influence and teachings will affect the opera of the future is as yet problematic, but that his theories have gained ground rapidly during the past ten years is not to be questioned.—The Italians divide operas into four classes, the sacred, the serious, the semi-serious, and the buffo or comic; the French recognize but two divisions, the *grand opéra* and the *opéra comique*, the latter of which is partly spoken; while the Germans subdivide them into grand opera, serious, tragic, heroic, romantic, comic, and other classes. (See MUSIC.)

OPHICLEIDE (Gr. *ὄφις*, a serpent, and *κλέις*, a key), a large brass wind instrument of the trumpet species, having a loud tone and a deep pitch, and much used in military bands. It forms the base to the trumpets, and has a compass of three octaves and one note. Bass ophicleides are made in C and B \flat , alto ophicleides in F and E \flat . The latter are little used.

OPHIDIANS. See SERPENT.

OPHIR, a name applied first (Gen. x. 29) to one of the sons of Joktan, and secondly to a region from which the fleet of Solomon brought gold and precious stones. The precise situation of Ophir is a matter of conjecture. There are four theories which have an appearance of probability: 1. That Ophir was a general name for distant southerly regions, just as we say the Indies for the East. This theory is supported by Father Acosta, Heeren, Tychsen, and others. 2. That Ophir was on the E. coast of Africa, embracing Zanzibar and Mozambique. Here have been found mines of gold and silver, which appear to have been worked extensively in ancient times. Among the advocates of this theory are Grotius, Petermann, Charles Beke, and Halévy. 3. That it was in southern Arabia, because in Genesis Ophir is spoken of as one of the sons of Joktan who settled between Sabæa and Havilah; because native gold was anciently found there; and because in Oman there is at present a city named El-Ophir, once the seat of considerable Arabian commerce. This opinion has been adopted by Abulfeda, Niebuhr, Volney, Gesenius, and others. 4. That Ophir was in India, because that country abounds in the articles mentioned as brought from both Tarshish and Ophir; because several of these articles, such as peacocks and sandal wood, are found nowhere else; because the Hebrew words for apes and peacocks correspond with the words used for the same on the Malabar coast; and because there was in India, in the neighborhood of the modern Goa, a district *Σονπάρα*, called by Arrian *Ὀππάρα*. This theory is maintained after Josephus by Bochart, Ouseley, Lassen, and Ritter, and apparently agrees with the Septuagint.

OPHITES. See GNOSTICS.

OPHIURANS (*ophiurida*), a family of star fishes in which the five rays are long, slender, flexible, and snake-like, whence the name; in some

the arms are very fragile; the common name of the genus *ophiura* is sand star, from their habit of hiding in the sand. The viscera are confined to the central circular disk; the arms are not excavated in grooves below for the protrusion of ambulacral tubes; they swim and creep with facility by means of the spines or the arms. In *ophiocomma* the arms are so readily detached, at the will of the animal, that



Serpent Star (*Ophiopholis*).

they are called "brittle stars." In the group of *euryalæ* the arms are much branched; the genus *astrophyton* of the North American coast has so great a number of terminal subdivisions, like snaky hairs, that it has been called *Medusa's head*; it is also called fisherman's basket, from occasionally having, when caught in deep water, fish and other animals embraced in the



Astrophyton Agassizii.

numerous flexible rays. According to T. Lyman, there are more than a dozen species of ophiurans on the coast of the United States.

OPHTHALMIA (Gr. *ὀφθαλμία*, from *ὀφθαλμος*, an eye), inflammation of the eyes. Under the head of ophthalmia may be included inflammation of all the various structures that enter into the formation of the eye; we shall here however confine ourselves to the inflammation

of the external and visible tissues. Inflammation of the white of the eye assumes a variety of forms, dependent partly on the special character of the inflammation and partly on the constitutional peculiarities of the patient.

1. *Catarrhal Ophthalmia*. Here the eyes are bloodshot, the redness being produced by injection of the network of vessels which covers the white of the eye, and early in the disease is most marked where the conjunctiva is reflected from the lids, while it gradually lessens as we approach the cornea. The lids are swollen, and sometimes the upper lid overlaps a little the lower one. The patient complains of a feeling as if there were sand in the eye, while there is a good deal of smarting and itching at the angles of the eyelids and along their free margins. There is at first lachrymation, which is soon followed by the secretion of a thin muco-purulent discharge which accumulates at the corners of the eye, and which with an increased secretion of the Meibomian glands glues the eyelids together during sleep. The disease may be brought on by irritation or injury of the conjunctiva, though atmospheric influences are its commonest cause. It is ordinarily mild and manageable, but when severe or badly treated it may produce ulceration of the cornea or leave the lids thickened and granular. In all cases of disease of the eye, absolute rest of the organ should be enjoined, and it should be protected from strong light and heat. In mild cases of catarrhal ophthalmia, rest, a brisk purgative, and the occasional application of tepid water to the eye, are often all that is necessary. If the inflammation does not subside in the course of one or two days, a weak solution of nitrate of silver (gr. ii.-vi. aq. $\frac{3}{4}$ i.) may be dropped into the eye once a day, and the eye may be bathed several times a day with a dilute solution of alum or of bichloride of mercury; while at night the edges of the lids may be smeared with dilute citrine or red precipitate ointment. In the severe form, bloodletting, either general, or more commonly by means of cupping glasses to the temples or of leeches, may be required. When the palpebral conjunctiva is congested and thickened, it may be scarified, and after the active inflammation has subsided it may be brushed over with strong nitrate of silver ointment or with undiluted vinum opii. 2. *Egyptian Ophthalmia—Purulent Ophthalmia*. This disease has probably existed at various places and various times, but the attention of the public was first strongly directed to it during the wars of Napoleon, when the British army returning from the expedition to Egypt brought the disease with them, and communicated it to other troops with whom they came in contact. The milder cases of purulent ophthalmia differ but little from the severer cases of the catarrhal form of the complaint; there is however even in these cases a very marked tendency to a granular condition of the lids. When the lids are everted they appear velvety, "the enlarged

papillæ being separated into groups by furrows and fissures, or tuberculated and sarcomatous looking, like a mulberry." (Jones, "Ophthalmic Medicine and Surgery.") In the severer forms of the disease the eyelids are tense, livid, and often enormously swollen, the upper overhanging the lower one; on separating them they often become everted, from the congested and swollen state of the palpebral conjunctiva. The conjunctiva lining the globe, red and swollen, soon becomes raised like a wall around the cornea (*chemosis*); a copious secretion of muco-purulent matter is poured out, runs down on the cheek, and bursts forth when the swollen lids are pressed asunder. The patient is unable to bear the light; there is burning pain in the eye, with pain around the orbit and in the temple, increasing at night. During the violence of the disease fever is present, though commonly moderate. The inflammation is not confined to the conjunctiva, but extends to the sclerotic and the cornea; the latter becomes vascular, opaque, and often ulcerated; sometimes it bursts, discharging the aqueous humor. The disease was first attributed solely to contagion imported by the British troops from Egypt, but it is now certain that it arises sporadically, and that under favoring circumstances, such as overcrowding, innutritious diet, or want of cleanliness, it becomes highly contagious. Purulent ophthalmia even in its milder forms requires prompt and decided treatment, both because the disease may at any time suddenly assume a violent and intractable form, and because of its tendency to produce thickening and granulation of the conjunctiva of the lids. When the disease is severe, or when it occurs in a strumous constitution, there is always great risk of permanent injury to the eye; in the worst cases the eye is sometimes destroyed in from 24 to 36 hours. In the severer forms of the disease recourse must be had to bloodletting, either general or by means of leeches or cupping glasses in the commencement; afterward the lids may be pencilled once a day with a solution of nitrate of silver, or brushed over with the lunar caustic in substance, and the eyes should be cleansed frequently with warm water or with a weak warm solution of alum or bichloride of mercury (alum gr. xvi., water $\frac{3}{4}$ viii., solve; or bichloride of mercury gr. i., hydrochlorate of ammonia gr. vi., water $\frac{3}{4}$ viii.). To relieve the congestion and swelling of the conjunctiva of the lid, it should be freely scarified, and when great chemosis is present recourse must be had to incision of the ocular conjunctiva. When the inflammation extends to the iris, as evinced by the irregularity and contraction of the pupil and by the change of color in the iris, mercury combined with opium may be cautiously administered, while the pupil should be dilated by the application of extract of belladonna around the eye. On the subsidence of active inflammation the diet should be improved, and iron, bitter tonics, and quinine may be neces-

sary. Gonorrhœal ophthalmia closely resembles the severest and most intractable forms of Egyptian ophthalmia, and is to be treated in a manner precisely similar. Its only cause is the direct application to the eye of gonorrhœal virus. 3. *Ophthalmia Neonatorum*. New-born infants are subject within a week or two of birth to a disease closely resembling catarrhal ophthalmia. The infant is first observed to have the lids glued together after sleep, their edges are red and slightly swollen, and the eyes themselves are weak and watery. The inflammation is at first mainly confined to the lids; as the disease advances they become swollen, tense, red, and shining; on being separated, a thick, yellow muco-puriform discharge bursts forth, the lids often become everted, and their conjunctival surface is seen to be velvety and dark red; the sclerotic conjunctiva is at the same time seen to be injected, and more or less chemosis is present. In the worst cases the cornea may become ulcerated and the eye destroyed; but if treated early enough the disease is easily subdued. In mild cases bathing and cleansing the eye several times a day with warm water, or with a weak collyrium of alum water, may be all that is necessary. In severe cases the nitrate of silver solution may be applied to the eye daily, while the eye is cleansed three or four times a day with the alum or bichloride of mercury solution. Sometimes it may be necessary to scarify the conjunctiva of the lids. 4. *Scrofulous or Strumous Ophthalmia—Phlyctenular Ophthalmia*. Strumous ophthalmia is eminently a disease of childhood, and, excluding ophthalmia neonatorum, before 12 years of age inflammation of the eye assumes this form in nine cases out of ten. While it is most common in children presenting other evidences of the strumous diathesis, it sometimes occurs in those whose constitutions are apparently without taint. It is early marked by great intolerance of light; the child seeks the shade, shelters the eye with the hand, bends down the head, and keeps the eyelids nearly closed. Any attempt to open the eye is resisted by a spasmodic closure of the eyelids, which the child even if inclined is unable to resist. On forcing them open there is often little appearance of inflammation, merely a faint blush of redness, with perhaps a few vessels running from the angles of the eye toward the cornea. As the disease advances, one or more phlyctenulæ form upon the cornea, and these bursting leave small ulcers. There is commonly little suffering except from the intolerance of light, and from the excoriation caused by the tears running down the cheek. The child is fretful, the appetite irregular, and the digestive organs disordered. The disease is apt to be obstinate, with a great tendency to relapse. When ulceration of the cornea occurs, a permanent cicatrix (*leucoma*) is apt to be left. In bad cases the ulceration may penetrate deeply, the cornea be pierced, the aqueous humor discharged, and prolapse of the iris

take place. The treatment may be commenced by an emetic of antimony or ipecacuanha (vini antimonii ii., or ipecacuanhæ 3 i. - 3 ii., every ten minutes until vomiting is produced; afterward a purgative dose of calomel and rhubarb, or of calomel followed by a rhubarb and soda mixture, may be given. The bowels should be kept open and their secretions regulated by minute doses of hydrargyrum cum creta or calomel with rhubarb, soda, and ipecacuanha; and finally sulphate of quinia may be given in doses of from one to two grains three times a day. This last in many cases seems to act like a specific. Iron, in the form of lactate, pyrophosphate, or ammonio-citrate, is often useful in conjunction with the quinine. An infusion of belladonna applied as a wash is frequently of service in relieving the photophobia. Finally, in some cases, counter-irritation by small blisters, applied behind the ears, may be necessary. 5. *Scleritis*—*Rheumatic Ophthalmia*. Here the inflammation in pure cases is confined to the sclerotic coat, though it is apt to extend to the cornea or iris, or to be complicated with conjunctivitis (catarrho-rheumatic ophthalmia). The redness of the eye is of a pink tint, forming a zone around the cornea when it is most marked, and gradually shading off toward the circumference of the eye, the vessels being minute and disposed in radiating straight lines. The cornea becomes dim, and vessels may be seen encroaching upon its margin to the extent of $\frac{1}{10}$ or $\frac{1}{20}$ of an inch, and then suddenly stopping. The iris becomes discolored and the pupil contracted and sluggish, and sometimes hazy; there is intolerance of light, lachrymation, and dimness of vision. The patient suffers from pain, compared to that of rheumatism, in the temple or around the orbit, which is increased at night and remits toward morning; and there is also deep-seated pulsatile pain in the eyeball. There is constitutional fever, the appetite is destroyed, and the rest broken. One eye alone is commonly affected, or if both are attacked one is much worse than the other. In mild cases a full dose of calomel and opium may be given at bedtime, followed by a purgative on the following morning; afterward nitrate of potash, in doses of from gr. x. to gr. xx., may be given three times a day dissolved in barley water. In severe instances recourse must be had to the abstraction of blood, and small doses of calomel and opium are to be given every night until the gums are slightly affected. Counter-irritation by means of blisters is often decidedly useful; occasionally colchicum has seemed to be of service; the iodide of potassium has likewise been given with success.

OPIE. I. John, an English painter, born at St. Agnes, near Truro, Cornwall, in 1761, died in London, April 9, 1807. He pursued his studies without instruction, and had acquired some skill when he attracted the notice of Dr. Wolcott of Truro (Peter Pindar), who in 1781 brought him to London. There he was named

the "Cornish wonder," and frequently the street in front of his residence was blocked up by the carriages of his visitors, and hardly a year had passed before he had painted the principal nobility. His portraits, remarkable for vigor and truth, lacked elegance and refinement, and his popularity sank almost as suddenly as it had risen. He had, however, already earned a handsome competence, and sought to increase it by marrying the daughter of a wealthy pawnbroker. The match proving unhappy, they were divorced, and Opie married again in 1798. He set about correcting his defects, and applied himself to historical painting, in which he produced several popular pictures, as "The Murder of James I. of Scotland," "The Death of Rizzio," "Arthur taken Prisoner," "Hubert and Arthur," "Belisarius," and "Juliet in the Garden." In 1806 Opie was elected professor of painting at the royal academy, and as such he delivered in February and March, 1807, four lectures on design, invention, chiaroscuro, and coloring, but died before he had completed the course. His lectures, with a memoir, were published in 1809 by his widow. His pictures, though wanting in dignity and grace, are distinguished for their reality and homely truth, and for their purity of color. II. **Amelia** (ALDERSON), an English authoress, second wife of the preceding, born in Norwich, Nov. 12, 1769, died there, Dec. 2, 1853. In 1798 she was married to Mr. Opie. Previously she had written much, but published nothing except a novel which attracted no attention. On the death of her husband she returned to her father's home in Norwich, where she spent the rest of her life. In 1825 she joined the society of Friends, and in a great measure gave up literary pursuits. Her principal publications are: "Father and Daughter" (1801); "Poems" (1802); "Adeline Mowbray, or Mother and Daughter" (1804); "Simple Tales" (1805); "The Warrior's Return, and other Poems" (1808); "Tales of Real Life" (1813); "Illustrations of Lying" (1825); "Deduction Displayed" (1828); and "Lays for the Dead" (1833). Her life has been written by Miss C. L. Brightwell (8vo, London, 1854).

OPITZ, Martin, a German poet, founder of the first Silesian school, born in Bunzlau, Silesia, Dec. 23, 1597, died in Dantzic, Aug. 20, 1639. He studied at Frankfort-on-the Oder and Heidelberg, travelled with a rich Danish friend, and lived subsequently at various petty courts of Germany, officiating also for a time as professor of philosophy and belles-lettres at Weissenburg in Transylvania (now Carlsburg). He was ennobled by the emperor Ferdinand II. in 1627 under the name of Opitz von Boberfeld; and having fled before the horrors of the thirty years' war to Poland, he there became historiographer of King Ladislas IV., and fell a victim to the plague. Owing to the fear of contagion, his papers and manuscripts were put away and lost. He rendered important service to German literature, especially in

refining the language. A good edition of his poems is in the first volume of Wilhelm Müller's *Bibliothek deutscher Dichter des 17. Jahrhunderts* (Leipsic, 1822).

OPIUM, a medicinal drug, the inspissated juice of the capsules of the white poppy, *papaver somniferum*, and its varieties. (See POPPY.) The medicinal qualities of the poppy were known in early times, and an extract from the whole plant called meconium (*μηκόνιον*) was employed; this was very much less active than that obtained from the capsules only, which to distinguish it from the other was called *opos* (*ὀπός*), the juice, from which we derive the word opium. The Arabs formed their name *afyun* from *opos*, and from this the Chinese get *o-fu-yung*, which is one of their names for the drug; they also call it *ya-pien* and *o-pien*, evidently from the English opium. In the 3d century B. C. the distinction was made between opium and meconium, and very early preparations were in use called *theriaca*, which consisted of opium combined with saffron, ambergris, and various other aromatics, and regarded as proper presents to sovereigns and other dignitaries. It is probable that the collecting of opium began in Asia Minor, and gradually extended to other countries; it is now supplied to commerce by Asia Minor, Persia, India, China, and Egypt, while experiments in its production have been made in different parts of Europe, Algeria, Australia, and several of the United States, including California.—In the various opium-producing countries the method of collecting the drug, while essentially the same, is modified in its details. The opium poppy is an annual requiring a rich soil, and its time of sowing depends upon the requirements of the climate; in Asia Minor it takes place in November, and large cultivators sow at intervals for three months, to guard against losses by insects, storms, &c., as well as to avoid having the whole come to maturity at once. The land being thoroughly prepared, the seed is sown broadcast, and covered by the use of a drag; the field is afterward laid off into beds about 10 ft. wide, for irrigation and to facilitate working; the plants are thinned and kept weeded. A few days after the petals fall the young capsules, then about $1\frac{1}{2}$ in. in diameter, are scarified, which is here done with a knife about half way of the capsule and transversely; much skill is required to make the incision just the right depth, as if made through the wall of the capsule the juice would flow into the cavity and be lost; the cut extends two thirds around the capsule, or may be made spirally and end beyond the starting point. The scarifying is done in the afternoon, and the following morning the exuded juice is scraped off with a knife and placed in a leaf held in the left hand. When enough of the half-dried juice is collected to form a cake, varying from a few ounces to 2 lbs. or more, it is wrapped in poppy leaves and put in the shade to dry. The opium in this condition is purchased by the

buyers, who travel from one village to another and gather it in small lots, and work it over themselves, or put it into cotton bags and take it to Smyrna for inspection and final working and packing. This is known in commerce as Smyrna or Turkey opium, and is the most esteemed in this country and Europe; it comes in tin cases soldered tight and enclosed in a case of wood; each case contains about 140 lbs., in lumps varying from an ounce to several pounds. This variety when fresh is readily moulded by the fingers and cut with a knife. Egypt furnishes some opium, but of poor quality; 30 years ago it was quite common in our shops, but it is now rare. Considerable opium is produced in Persia, some of which has of late begun to be exported to Europe; it is made into cones and flat cakes, and is of variable quality, some being largely adulterated. Chinese opium is not known in commerce. China not only consumes nine tenths of that exported from India, but all its own product, which has increased to a large amount within a few years, and has seriously affected the importations from India. The drug is produced in various parts of the East Indies, but the principal seat of its culture is along the Ganges, where, in a tract about 200 m. wide by 600 m. long, in 1872 between 500,000 and 600,000 acres were devoted to the poppy. In some districts the manufacture is under government control, while in others it is left to private enterprise, the government exacting an export duty. The methods of collection and preparation differ somewhat from those followed in Asia Minor. Besides injuries from frost, storms, and insects, the poppy in India is liable to the attacks of a species of broom rape (*orobanche*), which is parasitic upon the roots of the plants and renders them worthless. When the plants are in full flower and the petals are about to fall, these are carefully collected and made into cakes about a sixth of an inch thick, and 10 to 14 in. in diameter; this is accomplished by placing them in successive layers upon a plate of iron or earthenware, which is sufficiently heated to cause the juice in the petals to exude and glue the mass together; these cakes of petals, called leaves, are sold at the government factories with the opium. In India the scarifying of the capsules is done vertically, from the base upward, with a knife called a *nutshur*, consisting of three or four two-pointed blades, bound together with cotton thread, which is passed between the contiguous blades so as to slightly separate them. Parallel incisions are made at one operation, and this is repeated on the same capsule in different places at intervals of a few days, from two to six times. The collection is made the next day by means of a sort of sheet-iron spoon, and an earthen jar which the operator carries at his side. The juice when collected is very moist, consisting of a pinkish granular mass, from which drains a coffee-colored liquid called *paseva*; this is drained off and preserved, while

the more solid mass is dried in the shade for three or four weeks, with occasional turning. The dead leaves and stalks of the poppy plants are broken up to a coarse powder called trash, which is used in packing. East India opium is in globular cakes about 6 in. in diameter, and weighing about $4\frac{1}{2}$ lbs. The ball is made in a hemispherical brass cup, which is first lined with the leaves or petals to the thickness of half an inch; these are pasted together with a mixture called *lewa*, which is prepared from the *pasewa*, the washings of the various utensils used to contain opium, some good opium and some poor, all boiled down to a semi-fluid paste; when the leaves for half the ball have been pasted, the ball of opium is placed in the cup, and the other half of it covered with leaves in a similar manner; the completed ball is then rolled in poppy trash and dried in the sun for three days, and then placed on a frame under cover and turned frequently, until the exterior becomes quite hard, when it is ready to be packed for exportation. Malwa, Patna, and Benares are the principal varieties of India opium, and there are minor ones named from the districts producing them. Although all our supplies of opium are imported from Turkey, it has been successfully produced in France, England, and the United States; and some entertain the opinion that the opium poppy can be profitably cultivated in this country both for the sake of the opium and for the seed, from which a fine bland oil can be made after the opium crop has been collected. In Prussia opium has been largely produced and extensively used by morphine makers. In Turkey, prior to 1857, 2,000 baskets were considered a fair crop. In 1869-'70 the crop was 3,150 baskets, and in 1870-'71 over 7,000. Subsequent large crops have been about 8,000 baskets. The consumption keeps pace with this increased production, and better prices are obtained than formerly. In the year ending in March, 1872, the export from India was 93,364 chests, of about 160 lbs. each; the net revenue to the government from the drug for 1871-'2 was £7,657,213. The amount of opium and its extracts imported into the United States in the year ending June 30, 1873, was 319,134 lbs., valued at \$1,978,502.—The chemical composition of opium is remarkable. The alkaloid morphia, its most valuable constituent, was discovered by Sertürner, an apothecary at Einbeck, Hanover, who in 1816 announced the existence of an organic alkali, or alkaloid as it is now termed, in opium, and thus opened the way to the discovery of similar principles in many other vegetables. Before this, Derosne of Paris (1803) had obtained crystals from opium which are now known to have been narcotine. The United States government does not permit the importation of opium which does not assay 10 per cent. of morphia, from a sample fairly representing an entire package. The lumps of opium vary in the amount of morphia which they contain from 1 to 15 per

cent. The amount of moisture in crude opium varies from 5 to 20 per cent. The only practical way of getting a uniform morphia strength in opium is to use it in the form of powder, made by drying and pulverizing a full case containing about 100 lbs., whereby a product having 10 to 13 per cent. of morphia will be obtained. The United States Pharmacopœia requires that all the preparations shall be made from powdered opium, to avoid the variation in strength that must result from using the crude drug. Good opium has a very characteristic narcotic odor, to most people very offensive. It has a reddish brown or fawn color, and its texture is compact. Opium is mostly used in medicine in the form of liquid preparations, of which the following are the most important:

Tincture of opium, or laudanum..	13 minims=1 gr. opium.
Elixir, or deodorized tincture....	11 " " "
Wine of opium.....	8 " " "
Vinegar of opium, or black drop..	$6\frac{1}{2}$ " " "
Camphorated tincture of opium, or paregoric elixir.....	272 " " "

It is the most complex article of the materia medica, not less than twelve distinct alkaloids and two characteristic organic acids having been found among the proximate principles contained in it, besides a volatile odorous substance and many others of less importance. The alkaloids are mainly in the form of salts combined with meconic, thebolactic, and sulphuric acids. It yields its virtues to water, alcohol, and diluted acids, but not to ether. Diluted alcohol or proof spirit is the menstruum best adapted to make the most complete liquid representative of opium; it dissolves everything of value, leaving an inert residue, which if the opium is pure consists only of the scrapings of the poppy capsules. About two thirds of the opium is dissolved by diluted alcohol. Water will dissolve about one half of the opium, but it will not take up the resinous and odorous matters that abound in the drug.—Morphia ($C_{17}H_{19}NO_3 + H_2O = 303$) is the most abundant and by far the most important ingredient in opium. It probably exists in the drug as a meconate, and partly also as thebolactate and sulphate, in each of which forms it is quite soluble in water. There are many processes by which morphia can be prepared from opium. The simplest and best is the Staples process, official in the United States Pharmacopœia, of which the following is an outline. An infusion of the opium is evaporated until eight parts are obtained from one of opium; this is mixed with an equal volume of alcohol and water of ammonia added in slight excess, and the mixture set aside for 24 hours, during which time the morphia separates in crystals at the bottom of the vessel. By redissolving in boiling alcohol and treating with animal charcoal, the coloring matter can be removed and the morphia obtained in colorless prismatic crystals, having nearly 6 per cent. of water of crystallization. They are solu-

ble in about 1,000 parts of cold and 400 parts of boiling water, and in 14 parts of boiling and 20 parts of cold alcohol; they are readily dissolved by the fixed alkalies, but very sparingly by ammonia. With acids morphia forms salts soluble in water, of which the sulphate is the most important and most used in the United States. This forms beautiful white, minute, feathery crystals, soluble in two parts of cold water, and still more soluble in boiling water. One eighth of a grain is equivalent to one grain of powdered opium. In England the muriate is most used. The acetate is also considerably used in both countries. Morphia and its salts are characterized by striking a blue color with neutral ferric chloride, and by giving a red color with nitric acid, passing into yellow. Narcotina is an alkaloid, and forms salts with the acids which are very bitter, but is itself tasteless. It exists in opium for the most part free. It is easily obtained in fine large crystals, which are insoluble in cold water, soluble in 400 parts of boiling water, and in 100 parts of cold and in 24 parts of boiling alcohol, which deposits in crystals on cooling; it is very soluble in ether, which is its best solvent. Codeia was discovered by Robiquet in 1832, and has been to some extent used as a substitute for morphia, but is far less active. Narceia was discovered by Pelletier in 1832. It has been employed to a limited extent, but its great cost, \$50 an ounce, will always prevent its general employment. The following statement of the proportionate quantity of the more important constituents of opium is given on the authority of Messrs. T. and H. Smith: from 100 parts of opium, 10 parts of morphia, 6 of narcotina, 0.15 of thebaina, 1 of papaverina, 0.30 of codeia, 0.02 of narceia, 0.01 of meconine, 4 of meconic acid, and 1.25 of thebolactic acid. Meconic acid is of some consequence as the acid with which the alkaloids are in part naturally combined, which combination is restored in the preparation known as bimeconate of morphia. It also gives certain characteristic color reactions, which may be of value in detecting the presence of opium in mixtures. To the volatile odorous principle is due the unpleasant smell of the drug, and perhaps some of its disagreeable after effects, since the deodorized tincture or elixir of opium agrees with some persons who cannot bear the ordinary non-deodorized tincture or laudanum.—The physiological and therapeutical action of opium is represented, with no very important variations, by that of morphia, the other constituents being present in opium in so small quantity as not very materially to affect its operation. It is customary and convenient, in speaking of the action of opium or morphia, to divide it into two stages, a primary one of excitement or stimulation, and a secondary one of narcotism. A small dose of morphia produces at first a slight mental excitation, which is usually quiet and dreamy, with but few external manifestations.

The pulse is somewhat accelerated and the temperature slightly raised. This condition of tranquillity and comfort may last for several hours, or sooner or later pass into a quiet sleep, which in the daytime is likely to be short, but at night may be continued into the usual sleep. Some headache, nausea, and lassitude may follow the awakening; but these vary much with the dose and the individual. The secretions, excepting that of the skin, are diminished. Females are somewhat more liable than males to the unpleasant after effects, and nervous, excitable individuals than those of an opposite disposition. As the dose increases, the stage of stimulation becomes shorter, the sleep becomes more heavy or deepens into coma, the pulse and respiration become slow, the face pale or livid, the skin covered with a cold perspiration, and the pupil contracted. From this condition the patient may recover, or, the breathing becoming more shallow and the aëration of the blood less perfect, death ensues. Violent stimulants may arouse a person from the condition last described for a few moments, only to sink again into unconsciousness as soon as left to himself. When pain is present, it disappears or diminishes under the influence of the drug, and the dose may be increased almost in direct proportion to the severity of the pain. But it is by no means necessary for the relief of pain in all cases to induce a condition of unconsciousness or anything approaching it. Severe neuralgic or spasmodic pain will often entirely disappear under a dose which merely excites the patient, or indeed simply restores him to his normal condition of comfort and cheerfulness. It is impossible to state with accuracy the fatal dose, so wide are the limits fixed by age, habit, and idiosyncrasy. The usual commencing dose of morphia is from the eighth to the third of a grain, although smaller doses are by no means without effect, and larger ones are often used in cases of severe pain. Children are peculiarly susceptible to the poisonous action of the drug. The treatment of opium poisoning consists in evacuating the stomach, the use of strong coffee, the application of powerful irritants, as flagellation, the cold douche, or the galvanic battery, and occasionally small doses of atropia or tincture of belladonna. The patient should not be permitted to sleep. In therapeutic doses opium differs from morphia in its somewhat greater liability to produce headache, nausea, and constipation. Their poisonous action is practically identical. The therapeutic uses of morphia and opium are to relieve pain, cause sleep, relax spasm, check over-secretion, and in small doses to act as stimulants in various morbid conditions. The special diseases in which they may be used are too numerous to mention, but may be inferred from the foregoing. Opium may be administered by the mouth or by the rectum; morphia, in addition, by application to a blistered surface, or more conveniently and efficiently by injection

into the tissue beneath the skin by a small syringe attached to a perforated needle, called the hypodermic or subcutaneous syringe.—Among the other alkaloids of opium, narceia and codeia possess hypnotic powers considerably less than those of morphia, and but little if any anodyne effect. Papaverina is said by some observers to have similar properties, while others have seen little or no effect therefrom. Narcotina has been held responsible for some of the disagreeable after effects of opium, but subsequent investigation has shown that it has little to do with the narcotic effect. It is however a bitter, and has been used in India in the treatment of intermittent fever. Thebaina or paramorphia closely resembles strychnia in its action, but is present in opium in so small quantity that its effect counts for but little in the total. Pseudomorphia is interesting as presenting some of the chemical without the physiological properties of morphia. Cryptopia produces a peculiar delirium in the dog; but it has been separated in such small quantities that its effects on man are not known. Of porphyroxia and meconia but little is known physiologically. Opiania is probably narcotic.—The use of opium as an habitual stimulant, producing exhilaration and pleasant flights of fancy or dreams, is very prevalent in many parts of the world, our own country being by no means an exception. It is a vice less easy of detection than alcoholic intoxication, which it is said to replace where law and custom have made the latter disreputable. Its evil effects are most manifest upon the nervous and digestive systems. Among the symptoms may be mentioned loss of appetite, vomiting, pain in the stomach, obstinate constipation alternating with diarrhoea, emaciation, loss of strength, a trembling gait, pains in the limbs, mental sluggishness, hallucinations, and a condition resembling delirium tremens. The quantity which opium eaters accustom themselves to take is enormous, often exceeding 80 grains of opium or 10 grains of morphia. The use of opium by smoking and by mastication, to produce a kind of intoxication, has existed in the East for centuries; but it is not thought that opium smoking was much practised by the Chinese until the middle of the 17th century, though the drug was known to them medicinally in the 9th. So rapidly did the custom spread that in 1796 an imperial edict was issued against it; and the efforts to prevent its importation led to the war with the English known as the opium war, which terminated in 1842 by a treaty which allowed opium to enter Chinese ports. For smoking, the opium is made into an extract, and a small pill of this the size of a pea is placed in a pipe, lighted, and exhausted at a single whiff. The first effect is to make the smoker talk rapidly and laugh at slight causes; but soon the countenance becomes shrunken and pallid, and a deep sleep of hours follows.—The most celebrated work on the effects of the habitual use of opium

is De Quincey's "Confessions of an English Opium Eater" (London, 1822). See also "The Opium Habit," by Horace Day, with which is incorporated "Outlines of the Opium Cure," by Fitz Hugh Ludlow (New York, 1868), and "Opium and the Opium Appetite," &c., by A. Calkins, M. D. (Philadelphia, 1870).

OPODELDOC, a name given by Paracelsus to a plaster for all external injuries; now applied to a liniment which is much used as an anodyne application in sprains, bruises, and rheumatic pains. It is prepared by dissolving 3 oz. of common white soap in a pint of alcohol by the heat of a sand bath, and adding an ounce of camphor and a fluid drachm each of oil of rosemary and oil of origanum. It becomes a soft, translucent, yellowish white mass, of the consistency of soft ointment, which liquefies when rubbed upon the skin.

OPORTO, or **Porto** (Port. *O Porto*, the port), a city of Portugal, in the province of Minho, on the right bank of the Douro, about 3 m. from the sea, and 173 m. N. by E. of Lisbon; lat. 41° 8' N., lon. 8° 37' W.; pop. (including the six suburbs) in 1864, 89,194. It is the most important emporium of Portugal, and is officially styled the "loyal and unconquered city of Porto." It is built partly on level ground along the river, and partly on the sides and summits of two hills, and presents a fine appearance from the sea. On the land side it is protected by a small fort and an old wall flanked with towers; and the entrance to the port is commanded by the fort of São João da Foz. Along the river for about two miles extends a quay. A broad, well paved street extends to two other good streets, which join it obliquely and lead to the upper parts of the town. The other streets on the declivities are crooked and narrow, and a portion of the E. part is accessible only by steps cut into the rock. Among the finest squares is that of São Ovidio. The houses are generally well built, and are white-washed. There are more than 90 churches and chapels, the most prominent of which are the cathedral and the churches of São Francisco dos Congregados, São Ildefonso, and Dos Clerigos, the last famous for its tower, 210 ft. high. Other notable edifices are the bishop's palace, 15 convents, now used for secular purposes, the town hall, royal hospital, foundling hospital, exchange, and opera house. Among the principal public institutions are a library of 80,000 volumes, a mint, a museum, a medical college, an academy of navigation and commerce, a seminary, and many schools. The English factory house is a handsome building, with a library and public rooms. The city is lighted with gas, and has many gardens and fountains. A suspension bridge connects it with Villa Nova, on the opposite bank of the Douro, where, along the river, are extensive wine vaults. The summer resort of São João da Foz adjoins the city, and near it is the bar of the Douro, which prevents the ingress of

vessels of more than 500 tons burden, and is noted for maritime disasters. Measures for improving its navigation are in progress. The climate of Oporto is cold and damp in winter, but in summer it is exceedingly warm. The manufactures, which are of little importance,

consist chiefly of iron ware, hats, silks, linens, pottery, casks, and filigree work. Local industry is encouraged, and the consumption of foreign goods is limited by a high protective tariff. The total imports do not exceed \$800,000 annually. The exports consist principally



Oporto.

of port wine; this trade is almost exclusively in English hands, and would be more considerable if it were not for the British duty of £14 a pipe of 115 gallons; the exports in 1871 included 31,956 pipes, or nearly 3,700,000 gallons. The total value of the exports, comprising cattle (chiefly oxen), fruit, sumach, and lesser articles, such as oil, lemons, oranges, salt, leather, and cork, amounts annually to \$9,000,000. Nearly 700 vessels enter the port annually, upward of 100 of which are steamers. The city is connected with Lisbon and other places by railway.—The site of Oporto was anciently called Cale, afterward Portus Cale, whence the name of the country, Portugal. It was held alternately by the Moors and Christians from the 8th to the 11th century, and in 1092 the latter subdued it and remained in undisputed possession. John II. conferred many privileges upon it, but they were withdrawn in 1757 in consequence of the resistance of the inhabitants to a wine monopoly. The French captured it in 1808, but retired in the following year when Wellington crossed the Douro. Oporto was conspicuous during the revolutionary period of 1820. It suffered terribly in 1828-'33, when it was alternately the principal seat of Dom Miguel and Dom Pedro, and again during the revolution of 1847. (See PORTUGAL.)

OPOSSUM, the general name of the family *Didelphidae* of the order of marsupials, the *sarigue* of the French. They are confined to America,

extending from the middle states to Buenos Ayres on the south, and, with a few exceptions, to the east of the Andes. Some are as large as a domestic cat, but most are no larger than a rat. The form is rat-like, but the muzzle is longer, ending in a distinct naked muffle; the ears are large, membranous, rounded, and almost naked; the body rather stout; tail generally very long, with only a few minute scattered hairs, except at the root, and powerfully prehensile; the feet five-toed, plantigrade, naked beneath; all the toes with moderate claws, except the inner one of the hind foot; the hind thumb is distinct, and opposable to the other toes; mammae from 9 to 13, the odd one being in the centre of a ring formed by the others. The teeth are 50: incisors $\frac{5}{3}-\frac{5}{4}$, cylindrical, arranged in a semicircle, the foremost two the longest; canines $\frac{1}{1}-\frac{1}{1}$, the upper the longest; premolars $\frac{3}{3}-\frac{3}{3}$, two-rooted, compressed, and pointed; molars $\frac{4}{4}-\frac{4}{4}$, three-rooted, tubercular, with five prickly cusps. The stomach is simple, and the caecum moderately long. Opossums are mostly nocturnal, hiding among the foliage by day, and active at night in search of food. They are divided into two sections, according to the presence or absence of the pouch. Among those which have a well developed pouch belongs the common opossum (*Didelphis Virginiana*, Shaw), about 20 in. long, and the tail 15 in. additional; hair long, soft, and woolly, whitish at the roots and brownish at the tip, giving the animal a dusky

color; long white hairs are mingled with the ordinary fur of the body; face near the snout white, dusky around the eyes; ears black, with the base and margin whitish; legs, feet, and basal portion of tail brownish black. The mouth is wide, the jaws weak, the eyes small



Common Opossum (*Didelphis Virginiana*).

and high on the forehead, whiskers stiff, and tail capable of involution only on the under side. The opossum is sometimes active by day, but generally prefers to prowls in bright and still nights around plantations, rice fields, and low swampy places. The gait on the ground is slow, heavy, and pacing, but on trees, to which it takes when pursued, its motions are very lively; the sense of smell is acute; it is fond of lying on its back in the sun for hours. It is generally solitary, unless when bringing up a family. The teeth indicate its omnivorous character; its food consists of corn, nuts, berries, persimmons, roots, tender shoots, insects, young birds and eggs, mice, and similar small quadrupeds; sometimes it will kill poultry, sucking the blood but not eating the flesh, though it is far less mischievous in this respect than the mink, weasel, and skunk; it is very expert in climbing in search of food, hanging by the tail or swinging by it from one tree to another. When caught it feigns death, and will sometimes in this condition bear considerable torture without exhibiting signs of life, all the time watching its opportunity to bite or escape; hence the expression "playing 'possum;" when wounded, it is very tenacious of life. The flesh is edible; the skin is fetid; the hair is dyed by the Indians, and is woven into girdles and other ornaments. When taken young, it is easily domesticated. It is very prolific, bringing forth 12 to 16 at a birth, in the early part of March, May, and July, in South Carolina, and having even a fourth brood further south. The nest is made of dried grass, under a bush or root of a tree, and sometimes the Florida rat or the squirrel is forced to give up its lodging place; the time of gestation is 15 or 16 days; the young when first born are about half an inch long, blind and naked; the mother places them with her

mouth in the pouch, which she holds open with her fore feet, where they soon attach themselves very firmly, each animal to its teat; they grow very rapidly, increasing nearly tenfold in weight during the first week, and are very tenacious of life; when about five weeks old, or of the size of a mouse, they leave the pouch, returning to it to suck, or at the approach of danger; they remain with their mother about two months; the mother is very fond of her young, which are carried about, twisting their tails around that of the parent, and clinging to various parts of her body; the females are prolific at a year old. This species is found from the Hudson river to beyond the Missouri; it is replaced in Mexico, Texas, and California by the *D. Californica* (Benn.), a smaller animal with a comparatively longer tail, much darker on the body and limbs, the head dusky with a brown streak through the eye, chin and throat sooty, and the ears black. The crab-eating opossum (*D. cancrivora*, Gmel.) inhabits chiefly the northern parts of South America; the color is a nearly uniform brownish black, with the upper half of the tail whitish; the hair is glossy but harsh, very long (even to 3 in. on the back), and dirty yellowish white next the skin; the total length is about 32 in., of which the tail is one half. It prefers the swampy regions of Guiana, where small crabs abound, of which it is very fond; it also eats small birds, reptiles, and insects; its flesh is eaten by the Indians, and is said to resemble that of the hare. Several other species of this section are described by Waterhouse.—In the section containing opossums in which the pouch is rudimentary or entirely wanting, the size is smaller, and the young are carried principally on the mother's back, retaining their position by entwining their tails around that of the parent; here also belong about 20 species. Remains of opossums have been found in the calcareous caverns of Brazil, nearly allied to, if not identical with, existing species; Cuvier discovered in the gypsum quarries of Montmartre, of the Paris basin, an almost entire skeleton of a *didelphis*, which shows the existence of marsupials in Europe in the eocene geological period, contemporaneous with the *anoplotherium palaeotherium*, and other extinct ungulates. (See ЯАРОК.)

OPPELN, a town of Prussian Silesia, capital of an administrative district of the same name, on the Oder, 50 m. S. E. of Breslau; pop. in 1871, 11,879. It contains an old castle on an island in the Oder, a church built at the end of the 10th century, besides three other Catholic and two Protestant churches, a synagogue, a Catholic gymnasium, and a royal institute for midwives. It has an active trade in wine, cattle, and minerals, and manufactories of linen, ribbons, leather, and pottery. Oppeln was formerly a sovereign principality and the residence of the dukes of Upper Silesia of the house of Piast. The dynasty died out in 1532, when Oppeln was annexed

to the empire, and subsequently it became part of Prussia.

OPPENHEIM, a town of Germany, in the grand duchy of Hesse, on the Rhine, 10 m. S. by E. of Mentz; pop. in 1871, 2,926. It occupies the site of an ancient Roman castle, and at one time was one of the most important cities of the Rhine; but it was almost entirely destroyed by the French in 1689. The Protestant St. Catharine's church, one of the most magnificent Gothic edifices of Germany, and especially celebrated for its windows, is in ruins, excepting the E. part, which was restored in 1843. Nierstein and other places famous for excellent vintages are in the vicinity.

OPPERT, Jules, a French orientalist, born in Hamburg, of Jewish parents, July 9, 1825. He received a classical education, studied law at Heidelberg, and Sanskrit and Arabic at Bonn. He next studied the Zend and the ancient Persian, and published a treatise at Berlin on the vocal system of the latter language. His religion incapacitating him for a professorship in a German university, he went to France in 1847, obtained the professorship of German at the lycéums of Laval and Rheims, and was appointed on the scientific expedition sent by the government to Mesopotamia. After his return in 1854, he submitted to the institute a new system of interpreting the inscriptions. He also laid before the geographical society of the institute a plan of ancient Babylon. For 20 years he has devoted himself chiefly to the study of cuneiform inscriptions. In 1857 he was appointed professor of Sanskrit in the school of languages attached to the imperial library. Among his works are: *Les inscriptions des Achéménides* (1852); *Études assyriennes; L'Expédition scientifique de France en Mésopotamie* (1858-'64); *Grammaire sanscrite* (1859); *Les fastes de Sargon*, in company with M. J. Ménant (1863); *Grande inscription du palais de Khorsabad* (1864); *Histoire des empires de Chaldée et d'Assyrie, d'après les monuments* (1866); and *L'Immortalité de l'âme chez les Chaldéens, suivi d'une traduction de la descente aux enfers de la déesse Istar Astarté* (1875).

OPPIAN, a Greek poet, born in Cilicia, flourished about A. D. 180. He belonged to a distinguished family. His father having been banished to the island of Melita, Oppian accompanied him, and there wrote his *Halieutica*, a poem on fishing, in 3,500 verses. A poem entitled *Cynegetica*, "On Hunting," attributed to him, modern critics suppose to have been written by another person of the same name. The best edition of the two is that of Schneider (Strasburg, 1776).

OPTICS, the science which treats of the nature of light, and of the laws of the phenomena of light and vision. For the theories of light, and other branches of the subject, see the articles **ABERRATION**, **CHROMATICS**, **FLUORESCENCE**, **LIGHT**, **SPECTRUM**, **SPECTRUM ANALYSIS**, **SPECTACLES**, **STEREOSCOPE**, and **VI-**

sion. The present article will be devoted chiefly to the laws of reflection (catoptrics) and those of simple refraction (dioptrics). These form a large portion of geometrical or formal optics, in which, without regard to any theory, the actual phenomena of light are observed and generalized, and the laws of the changes effected in the rays by surfaces and media are ascertained. In connection with the transmission of light one other general fact may be noticed. It is that, with the exception that some degree of dimness will arise when the interposed body of air is of great extent, a given surface, as that of the side of a house, illuminated in the same degree, appears equally luminous, at whatever distance it may be regarded. This equal brightness at different distances is readily explained when we remember that the actual intensity of light from a point or unit of surface diminishes in inverse ratio as the square of the distance increases; and that, since any linear magnitude diminishes in the inverse ratio of the simple distance, so a surface must also appear lessened in the ratio of the square of distance; less light comes to the eye from a given surface at increased distance, but the actual surface becomes contracted into an apparent surface less in the same proportion; and thus one effect balances the other, and the actual illumination is reduced by the effect of the aerial perspective only.—The ancient Greeks and the Arabians made considerable progress in formal optics, but chiefly in the discovery of the law of reflection, and of consequences flowing from it. They had attained the idea of rays of light, the fact of their ordinary straight-lined transmission, and the law of equality of the angles of reflection and incidence, and deduced with much completeness the properties of shadows, perspective, and the convergence of rays by concave mirrors. Euclid and the followers of Plato, however, taught that these rays proceed from the eye, not from the visible object. Aristotle reasoned that an interposed medium was necessary to vision; this he considered to be light, and defined as "the transparent in action." Of special treatises on light, the earliest known are the "Optics" of Euclid, Heron's "Catoptrics," and Ptolemy's "Optics." In the last of these occurs an elaborate collection of measurements of the refraction at different angles, from air to glass, and from glass to water—tables of much interest, as furnishing the oldest extant example of an accurately conducted physical investigation by experiment. Tycho Brahe introduced a correction for atmospheric refraction into astronomical calculations; the telescope appears to have been invented separately by Metius and Jansen about the year 1608; and Kepler, with his usual fertility of mathematical elements and of hypotheses, and incited by these advances, strove earnestly to find the true law of relation of the angle of refraction to that of incidence, but reached only a near

approximation. The actual relation, known as the "law of the sines," was discovered by Willebrord Snell, about 1621. Descartes, who unjustly claimed this discovery, has really the merit of having applied it so as to explain the general formation and the angles of the rainbow. Newton in 1672 published his remarkable discoveries in connection with the decomposition of light by aid of the prism, with the doctrine and measure of the refrangibilities of the different colors, and the agreement of the phenomena with those of the rainbow. His discoveries resulted in improvements in the telescope, and also in explaining a prominent defect in the refracting telescope, that of the colored borders of images, due to chromatic aberration. Dollond about 1757 discovered the possibility of achromatic combinations of lenses, and produced the first of these. The first notice of double refraction is that of Bartholin, 1669; but Huygens first satisfactorily explained the phenomena, by means of his since renowned undulatory theory of light, his treatise upon which was written in 1678, and first published in 1690. He also first observed the fact of polarization; though the distinct discovery of this phenomenon was not made until more than a century later, namely, by Malus in 1808, who commenced a thorough study of the subject; and this was much extended by Young, Fresnel, Arago, Brewster, Biot, and Seebeck. Hooke appears first to have studied the colors of thin plates, which he described in 1664; and these colors Newton and Young afterward turned to very important use. Diffraction and the fringes of shadows were discovered by Grimaldi in 1665; depolarization, with the production of periodical colors in polarized light, by Arago in 1811; the relation of optical properties to the symmetry and axes of crystals, by Brewster in 1818. The general explanation of most of these phenomena by the undulatory theory is due to the labors of Young and Fresnel, from 1802 to 1829; and these have since been carried forward and corrected by the labors of Airy, Hamilton, Lloyd, Cauchy, and many others. Still other discoveries in optics, especially the more recent, as those made in connection with color, the velocity and physical modifications of light, the various optical instruments, and photography, will be found mentioned under the proper heads.

I. CATOPTICS.

When rays of light fall on a surface of an opaque, and in some degree smooth or polished body, a portion of those rays, greater or less, but never the whole, is thrown off again from such surface, and this light is said to be reflected. Opaque surfaces reflecting in a high degree are termed *specula*, or mirrors. Suppose a ray or minute beam incident on a polished plane surface in any direction whatever, and let fall at the point of incidence a perpendicular to the surface; then, first, it is universally true that the reflected ray will be situated in the same plane in space in which this

perpendicular and the line of the incident ray are situated. Thus we may always determine the plane, vertical to the reflecting surface, in which to look for the reflected ray. The angle $\angle IOP$, fig. 1, included between the perpendicular and incident ray, is termed the angle of

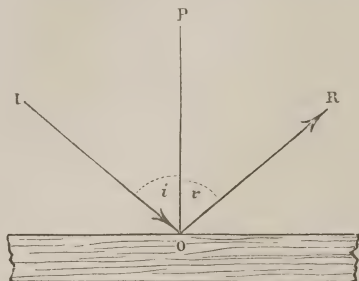


FIG. 1.

incidence; that between the same perpendicular and the reflected ray, $\angle POR$, the angle of reflection. These angles are always equal. Thus, the fundamental and universal law of reflection from plane surfaces is simply this: the paths of the incident and reflected rays always lie in the same plane with the perpendicular to the reflecting surface drawn to the point of incidence; and in that plane the angle of reflection is always equal to the angle of incidence. This law is strictly verified by experiment and measurement. Necessary consequences of its truth are, that beams or rays parallel before incidence on a plane mirror will remain parallel after reflection, and that divergent rays will after reflection continue to diverge, and convergent rays to converge, at the same rates as before impinging on the reflecting surface. All the facts relating to images in plane mirrors follow from the same law. But a very important truth in relation to images, and one too often lost sight of, must be premised. Parallel rays or beams of light, or a single beam, may show us the existence of the object emitting them, but they do not enable us to determine its place or distance. We can do this in regard to an object or image, or any point in it, only by means of pencils of light, divergent in themselves, proceeding from the points or point to the eye. We necessarily judge of the size of this object chiefly by the angle subtended at the eye by a line joining its extreme points (the visual angle); and of its distance by the amount of reconvergent action the eye must exert upon the pencils painting its several points, in order to focus them upon the retina, as well as by the convergency of the axes of the two eyes upon the place of the object, if near. (See STEREOSCOPE, and VISION.) The pencils of light from the various points of an object before a plane mirror, being divergent at the same rate after as before reflection, and the eye of necessity seeing the object in the direction in which the rays of light finally come to it, the determination of the position

and size of images resolves itself into investigating the images of a series of points. And first, the case of a single point, *A*, fig. 2, placed before a plane mirror, *MN*, will be considered. Any ray, *AB*, incident from this point on the mirror, is reflected in the direction *BO*, making the angle of reflection *DBO* equal to the

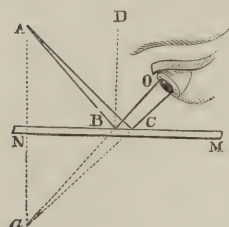


FIG. 2.

angle of incidence *DBA*. If now a perpendicular, *AN*, be let fall from the point *A* on the mirror, and if the ray *OB* be prolonged below the mirror until it meets this perpendicular in the point *a*, two triangles are formed, *ABN* and *NBa*, which are equal, for they have

the side *BN* common to both, and the angles *ABN*, *ABN*, equal to the angles *aNB*, *aNB*; for the angles *ANB* and *aNB* are right angles, and the angles *ABN* and *aBN* are equal to the angle *OBM*. From the equality of these triangles, it follows that *aN* is equal to *AN*; that is, that any ray, *AB*, takes such a direction after being reflected, that its prolongation below the mirror cuts the perpendicular *AN* in the point *a*, which is at the same distance from the mirror as the point *A*. This applies also to the case of any other ray from the point *A*, *AC* for example. From this the important consequence follows, that all rays from the point *A*, reflected from the mirror, follow after reflection the same direction as if they had proceeded from the point *a*. The eye is deceived, and sees the point *A* at *a*, as if it were really situate at *a*. Hence in plane mirrors the image of any point is formed behind the mirror at a distance equal to that of the given point from its front surface, and on the perpendicular let fall from this point on the mirror. It is manifest that the image of any object will be obtained by constructing according to this rule the image of each of its points, or at least of those which are sufficient to determine its form. Fig. 3 shows how the image

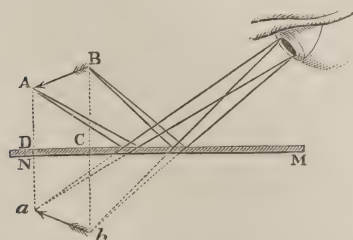


FIG. 3.

ab of any object, *AB*, is formed. It follows from this construction that in plane mirrors the image is of the same size as the object; for if the trapezium *ABCD* be applied to the trapezium *DCab*, they are seen to coincide, and

the object *AB* agrees with its image. A further consequence of the above construction is, that in plane mirrors the image is symmetrical in reference to the object, and not inverted. When an object is between two plane mirrors nearly parallel, the primary images seen in each of these are reflected as if at a greater distance in the other, and so on, forming in each mirror a long succession of images, growing more and more remote. As the mirrors are turned, approaching a right angle with each other, the number of repetitions grows less, and the whole take a circular arrangement. At a right angle, the object and three images are visible, arranged as represented in fig. 4. The rays *OC* and *OD* from the point *O*, after a single reflection, give, the one an image *O'*, and the other an image *O''*, while the ray *OA*, which has undergone two reflections at *A* and *B*, gives a third image *O'''*. When the angle of the mirrors is 60° , five images are produced, and seven when it is 45° . The number of images continues to increase in proportion as the angle diminishes, and when it is zero, that is, when the mirrors are parallel, the number of images is theoretically

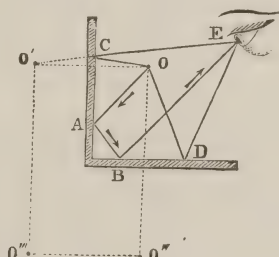


FIG. 4.

infinite. (See KALEIDOSCOPE.) The amount of light reflected from a surface of given size and polish is different with mirrors of different material; and it increases in all cases with increase of the angle of incidence, though not in all cases regularly. We observe the image of the sun in water near midday without difficulty; but when near the horizon the brightness of the reflected light is usually intolerable. Remembering that the surface impinged on by any single ray of light is extremely small, it will be seen that any curved reflector is in effect simply a collection of a great number of such minute planes; and that, if we consider the rays falling on such a surface as reflected from the same points in as many different planes tangent to the surface at the points of incidence, we at once extend the law for plane surfaces to all curved surfaces whatever. To the points of incidence of rays on any curved surface, *KAB*, fig. 5, let fall lines *CK*, *CI*, *CA*, &c., perpendicular (normal) to the surface at those points; each reflected ray will be in the plane containing its incident ray and its proper normal; and the angles of reflection, *CKI*, *CIH*, &c., and of incidence, *LKC*, *LIC*, &c., will be

equal for each ray on the two sides of its normal. Ordinary concave and convex mirrors are parts of spherical surfaces. The former must reflect parallel rays convergent, convergent rays more rapidly so, &c. The latter must reflect parallel rays divergent, divergent rays more

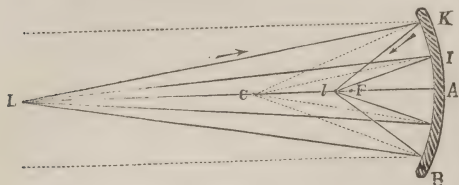


FIG. 5.

so, &c. Parallel rays falling on a concave mirror are reflected to a focus distant from the surface half the radius of curvature of such surface, *i. e.*, at one fourth the diameter of the sphere, as shown in fig. 6, where CD being the normal at the point of incidence D , the angle

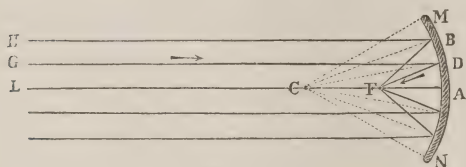


FIG. 6.

of reflection $CD F$ is equal to the angle of incidence $G D C$, and is in the same plane. It follows from this that the point F , where the reflected ray cuts the principal axis, divides the radius of curvature $A C$ very nearly into two equal parts. For in the triangle $D F C$, the angle $D C F$ is equal to the angle $C D G$, since they are alternate and opposite angles; likewise the angle $C D F$ is equal to the angle $C D G$, from the laws of reflection; therefore the angle $F D C$ is equal to the angle $F C D$, and the sides $F C$ and $F D$ are equal as being opposite to equal angles. The smaller the arc $A D$, the more nearly does $D F$ equal $A F$; and when the arc is only a small number of degrees, the right lines $A F$ and $F C$ may be taken as approximately equal, and the point F may be taken as the middle of $A C$. So long as the aperture of the mirror does not exceed 8° or 10° , any other ray, $H B$, will after reflection pass very nearly through the point F . Hence, when a pencil of rays parallel to the axis falls on a concave mirror, the rays intersect after reflection in the same point, which is at an equal distance from the centre of curvature and from the mirror. This point is called the principal focus of the mirror, and the distance $A F$ is the principal focal distance. If the angle of aperture of the mirror exceeds 10° , not all of the reflected rays will meet in one and the same focal point, but, by reason of the various angles of incidence made by the incident rays on the curved surface, the further the point of incidence of a ray is from the centre M of the mirror $A M B$, fig.

7, the nearer to that centre will the ray be reflected; but incident rays included in an angle of aperture of 10° will approximately be reflected to one focus F . Fig. 7 is an accurate representation of the paths of the reflected ray of an incident beam of parallel rays. M is the centre of figure of the spherical mirror $A M B$, C is the centre of curvature, and F is the focus. This departure from a true focus of rays reflected from spherical mirrors is called "spherical aberration." The curved line $A L F$ formed by the intersections of the reflected rays is called a "caustic." This caustic can be easily seen by placing a piece of paper in the same plane with the axis of the mirror, or by observing the reflection from a curved polished clock spring placed on a piece of white paper in the sunshine. Spherical aberration can only be avoided by using mirrors of small angles of

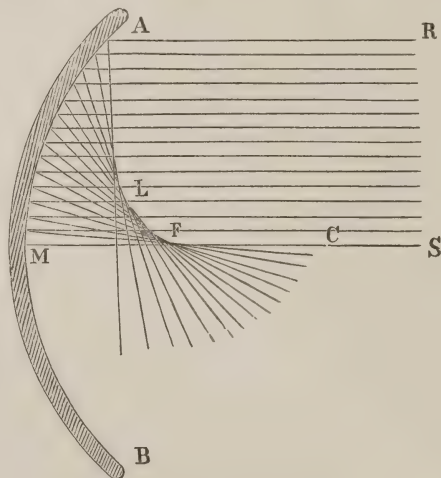


FIG. 7.

aperture, or by the use of mirrors having paraboloid surfaces, as shown in section in fig. 8. It is a well known property of the parabola that a normal bisects the angle made by a di-

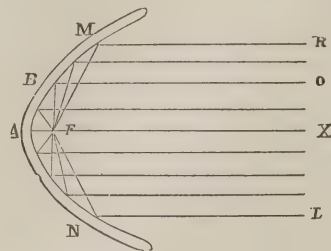


FIG. 8.

ameter at the point of contact with the line drawn from that point to the focus; hence all rays, $R M$, $O B$, in fig. 8, parallel to the principal axis $A X$, will be reflected to one point F , the focus of the mirror; and conversely, if F be a luminous point, all rays emanating from

it which fall on the mirror will proceed outward in parallel lines. This last mentioned property of paraboloid mirrors is applied in their use as reflectors on locomotives, and in lighthouses. But a large fraction of the rays emanating from the light at the focus of the

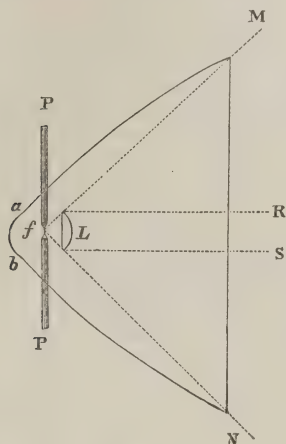


FIG. 9.

paraboloid do not strike the mirror, and therefore diverge and are not useful in illuminating distant objects. To render these diverging rays parallel to the axis of the mirror, Thomas Stevenson, engineer of the English board of northern lighthouses, devised in 1834 the ingenious plan of placing a lens, L , fig. 9, before the mirror, to intercept the cone of rays, MfN , which is usually lost by divergence. Opposite this lens is a portion of the mirror, ab , which is not paraboloidal but spherical, and the principal focus of the spherical mirror and of the lens is at f . By this simple device the cones of rays afb and MfN are brought into a beam of parallel rays, RS , which proceed in the same direction as the rays reflected by the paraboloid. Thus all of the rays are available, and from this property of these instruments they have been termed holophotal reflectors (Gr. $\delta\lambda\omicron\varsigma$, entire, and $\phi\acute{o}\varsigma$, light). The object before a common concave mirror being anywhere without the centre of curvature, the image is between such centre and the focus, inverted, real, and reduced in size; and the places of object and image are interchangeable—the foci are “conjugate,” *i. e.*, mutual. When the object is brought within the principal focus, the image is erect, virtual (behind the mirror), and magnified. The image with convex mirrors is always virtual, diminished, nearer the mirror than the object, and erect. II. DIOPTRICS. When a ray or a minute beam of light passes through any surface of division, separating vacuum from any medium, or any one medium from another of different density, a portion of the light is reflected at such surface, and another portion, never the whole, is transmitted. This transmitted light is always bent out of

its course at the surface of division, never within the medium, if this be homogeneous; and the light is then said to be refracted. If the medium be one of varying density, like the atmosphere, the ray is bent continually within it; but this case is equivalent to its passing through a succession of surfaces, dividing media more and more or less and less dense. Suppose a ray or minute beam of light transmitted at a point through a plane dividing surface, MN , fig. 10, between space and a medium, or any two media, and coming to such point in any direction whatever; let fall to this point of transmission, O , a perpendicular to the surface, OP , and passing through it, so as to lie in both the media; then, first, it is universally true that the ray, after refraction, will be situated in the same plane in space in which this perpendicular and the line of the ray before refraction are situated. Thus we may always determine within what plane, vertical to the refracting surface, to look for the ray after refraction. The angle POI , included between the perpendicular line and the ray

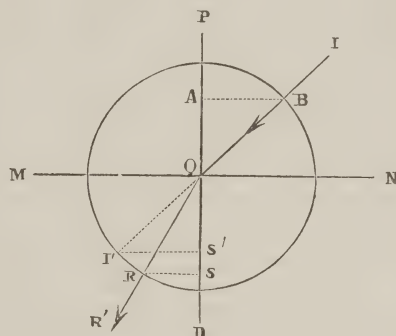


FIG. 10.

before refraction, is termed the angle of incidence, and may be represented by I ; that between the same perpendicular on the other side of the surface and the line of the ray after refraction, ROD , is the angle of refraction, R . These angles, the media being of different density, are never equal; nor have the angles themselves any direct ratio to each other. But if in the course of the ray before, and also after refraction, equal radii, OB , OR , measured from the point where the ray penetrates the surface, be taken, and from the extremities of these radii perpendiculars, BA and RS , be let fall on the perpendicular line already drawn, these latter perpendiculars, BA (or $I'S'$) and RS , will be the sines of the angles in which they are respectively, *i. e.*, the sines of the angles of incidence and refraction. For any two given media, no matter what the angle of incidence, the corresponding angle of refraction is such that the ratio of the sines is always the same—is a constant value. Thus, the fundamental and universal law of refraction at plane surfaces is also simple, though the con-

ditions to be kept in view are much more complex than in the case of reflection; it is this: The paths of the ray before and after refraction always lie in the same plane with the perpendicular to the refracting surface drawn to the point of transmission, and on opposite sides of that perpendicular; and in that plane the sines of the angle of incidence and of refraction have in all cases the same ratio for any two given media. This is "Snell's law;" and it also is rigidly verified by measurements. Suppose the refraction be that of a ray passing from air into ordinary crown glass; then, for all angles of incidence, the ratio $\frac{\text{sine } I}{\text{sine } R} = \frac{3}{2}$, very nearly. The angle of incidence is the greater, and the refraction is therefore toward the perpendicular. This is the case whenever the ray passes from a less to a more dense medium. And as, in all such cases, we have $\frac{\text{sine } I}{\text{sine } R} > 1$, this fact of a ratio greater than unity expresses a refraction toward the perpendicular. The value which the ratio $\frac{\text{sine } I}{\text{sine } R}$

may have, being constant for any two media, is called for such media the "index" or "coefficient of refraction," c . From air to water, $c = \frac{4}{3}$; from air to diamond, $c = \frac{5}{2}$; from water to crown glass, $\frac{3}{2}$; from crown glass to diamond, $\frac{5}{3}$. When light passes successively from air through water, crown glass, and diamond, these refractions are not added; but the ray has in any one of the media precisely the course it would have had if passed from vacuum or from air directly into the given medium. Thus, in the case supposed, the successive refractions would be $\frac{4}{3} \times \frac{3}{2} \times \frac{5}{3} = c = \frac{5}{2}$, the same as if the light had passed at once from air to diamond; and so in all cases. When the ray passes, on the other hand, from a denser medium to a rarer, we always find the ratio $\frac{\text{sine } I}{\text{sine } R} = c < 1$;

and this signifies that the ray is then bent from the perpendicular. Thus, from crown glass to air, $c = \frac{2}{3}$; from water to air, $c = \frac{3}{4}$; and so on. That is, in all these cases, sine I must be less than sine R , or sine $R >$ sine I . But the angle of incidence may vary from 0° up to 90° ; and the angle of refraction cannot exceed 90° , because this is the whole space between any surface and a perpendicular to it. Hence, for light going toward the rarer medium, there will be a limit of the angle of incidence beyond which no angle of refraction can be found sufficiently large. Rays meeting the surface at an angle greater than this limit cannot pass the surface. There is a mathematical impossibility, and hence a physical; and the light is wholly thrown back into the medium, *i. e.*, totally reflected. Fig. 11 gives a correct view of the paths of the rays proceeding from a radiant point R in the interior of a mass of water whose surface $S S'$ is contiguous to air. $R P$ is the path of the ray which is perpendicular to the surface $S S'$. The rays which diverge

are bent away from the perpendicular when they pass the surface $S S'$ into the air, and their directions are shown by the lines 1, 2, 3, &c.; but when the divergence has become so great that the sine of the angle of refraction (in air) must be greater than the radius in order

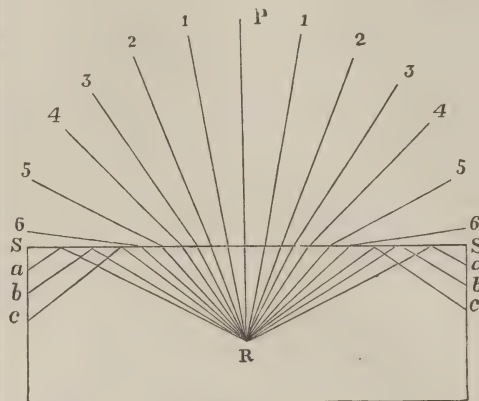


FIG. 11.

that the law of the constancy of the ratio of the sines shall hold, the rays do not pass through the surface $S S'$, but are reflected from that surface, as shown by the lines a , b , c . This total reflection is readily observed on looking in certain directions into a prism; its highly transparent surfaces serve as mirrors for objects situated so that their light falls without a certain angle; for crown glass, $41^\circ 48'$. Any small transparent body of a density unlike that of the medium it is in, and bounded by a curved and a plane or by two curved surfaces, is termed a lens. The combination of spherical surfaces, either with each other or with plane surfaces, gives rise to six kinds of lenses, sections of which are represented in fig. 12; four are formed by two spherical surfaces, and two by a plane and a spherical surface. A is a double convex lens, B is a plano-convex, C is a converging concavo-convex, D is a double concave, E is a plano-concave, and F is a diverging concavo-concave. The lens C is also called the

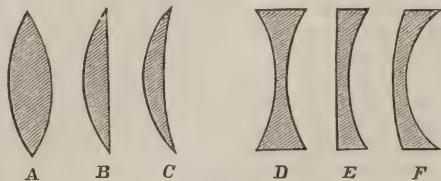


FIG. 12.

converging meniscus, and the lens F the diverging meniscus. The first three, which are thicker at the centre than at the borders, are converging; the others, which are thinner at the centre than at the borders, are diverging. Lenses are most conveniently made of glass,

and with spherical surfaces. As with mirrors, so with lenses, by considering any curved surface as composed of a multitude of minute plane surfaces, we at once extend to them the law of refraction; and it is then only necessary to know the angles of incidence and the value

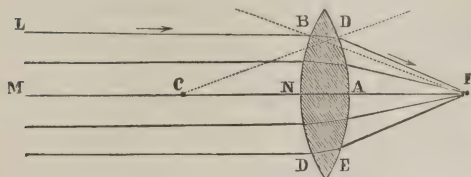


FIG. 13.

of c , in order to trace the course of the rays. The refraction toward a perpendicular at the first surface of a lens will conspire with that from the perpendicular at the second surface, both occurring in the same actual direction in space. A ray passing through the centres of curvature, C and F, fig. 13, of the surfaces, passes also through the middle point of the lens, and is not refracted. This line MF is the axis of the lens. Rays parallel to this axis are, when the lens is convex, brought to meet in a real focus F lying at some point in the axis; they are made to diverge as from a virtual focus somewhere in this line, whenever the lens is concave. The aperture of a lens is the total arc or number of degrees of curvature of surface on the two sides of the axis through which light is allowed to pass. Hence, it does not depend on size alone; and the minute lens which is merely a bead of glass has almost necessarily a much greater aperture than a lens of some inches or feet focus. The principal focus F of a double convex or double concave lens, of crown glass, of equal curvatures, is at the centre F of the sphere of which the lens surface BND forms part; the focal distance is equal to radius; for the plano-convex and plano-concave, it is equal to twice the radius. The general rule for finding the focal distance is: For the meniscus and concavo-convex lens, divide twice the product of the radii of curva-

the distance of twice the radius, on the other; and here, again, the places of object and image are interchangeable; the foci are conjugate. Fig. 14 shows the manner in which the image I of the candle C is formed by the lens L S. Cones of rays, having for their basis the surface of the lens and for their apices every point on the surface of the candle facing the lens, are refracted by the lens to points in the image corresponding to the points in the candle from which the rays emanated. When the object is brought within the principal focus on either side, the image is then on the same side, or virtual, erect, beyond the focal distance, and magnified. So, in the former case, the real image is magnified by bringing the object nearer the focus. The simple act of bringing an object at less than the ordinary distance of distinct vision from the eye, as when we look at small objects close to the eye through a pin hole, increases the visual angle, and so proportionally magnifies them. Hence it is that, for objects viewed as placed within the principal focus, the magnifying power increases with diminution of focal distance of the lens, being determined conveniently by the quotient of the ordinary limit of vision, say 8 inches, divided by the focal distance of the lens. Thus a lens, focal distance $\frac{1}{8}$ of an inch, has a linear magnifying power of $8 \div \frac{1}{8} = 400$ times; and of course a superficial magnifying power of $400^2 = 160,000$ times. Thus are explained the very high powers obtained by the use of minute spherical lenses in form of beads, of perfect glass. But it is only for a small aperture, say 6° or at most 8° , that the rays are brought rigidly to one focus. Enlarging the aperture, the successive rings lying without bring their light to foci successively nearer the lens; passing their foci, these rays diverge, and form an indistinct border of light about the image. This is spherical aberration of lenses. It is to some extent corrected by peculiar forms of lens, hence called aplanatic; the least spherical aberration thus obtained is with a double convex lens, the radii of whose curvatures are as 1 : 6; this, with the surface whose radius is 1 toward the object, gives an aberration of 1.07 times its own thickness. III. DISPERSION. The dispersion of light is the separation of the colors existing, actually or potentially, in white or solar light. It may occur by refraction, by diffraction, or by interference. (See COLOR.) The total length of spectrum obtained by prisms, *i. e.*, the total dispersion, and also the amount of spreading out of the different colors, differ with the nature of the medium or prism employed. Calling the refrangibility of the violet ray V', and of the red R', for a given prism, and the coefficient of refraction c , the dispersive power is
$$= \frac{V' - R'}{c - 1}.$$
 This ratio, for oil of cassia, is .139; for flint glass, .052; Canada balsam, .045; diamond, .038; crown glass, .036; water, .035; rock crystal, .026. Thus, for example, the to-

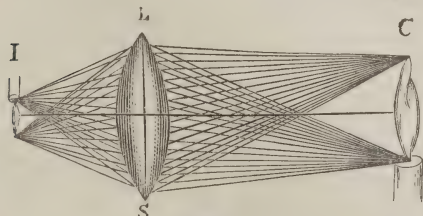


FIG. 14.

ture by their difference; for the double convex and concave, by their sum. When, for the double convex lens, the object is at any distance greater than twice the radius, on one side, the image is always somewhere between the focus and the other side of the sphere or

tal dispersion and length of spectrum for a hollow glass prism filled with oil of cassia, are about four times those of crown glass; and of flint glass, $1\frac{1}{2}$ time those of crown glass. Now, lenses, like prisms, must disperse or decompose light. The different colors are really brought to foci that, in the case of convex lenses, lie in the following order: The focus of the least refrangible or red ray corresponds with the true place of the principal focus; and the more refrangible rays are brought to foci within this, as the orange, yellow, green, blue, indigo, and violet, lying nearer and nearer to the lens. These colored rays cross at their foci, and again diverge; the effect is a colored border or fringe, mainly blue or red, as the case may be, surrounding the image, and more marked as the aperture of the lens is greater, and in objects toward the margin of the field of view. This is chromatic aberration of lenses. It is almost perfectly corrected by combining lenses in various ways, thus forming achromatic combinations. The principal of these is usually that of correcting, for example, the less dispersion of crown glass by the greater dispersive power of flint glass. To do this, a concave of flint of less entire curvature is combined with a crown glass, convex, and of the greater entire curvature. The dispersion is corrected; but part of the refractive or lens effects remains undestroyed, and the focal distance becomes greater. (See *ACHROMATIC LENS*.)

OPUNTIA. See *CACTUS*.

OPZOOMER, Carolus Wilhelmus, a Dutch philosopher, born in Rotterdam, Sept. 20, 1821. He studied at Leyden, where he wrote a "Letter to Da Costa," and "Examination of the Dutch Annals of Theology," both attacking Christianity. In 1846 he became professor of philosophy in the university of Utrecht. Among his philosophical writings is *De weg der wetenschappen* ("The Path of Knowledge," Utrecht, 1851; German translation, 1852), in which he advocated the most absolute rational empiricism. A revised edition was published as *Het wezen der kennis* (Amsterdam, 1863).

ORACLE (Lat. *oraculum*, from *orare*, to speak), in ancient religion, a revelation believed to be made by some divinity in reply to the questions of men; applied also to the place where such revelations were communicated. The responses were given either by the mouths of priests or priestesses, or by other signs. Responses of the oracle at Dodona were given either by the movement of leaves, the noise of brazen vessels, or the murmuring of the waters of a fountain. Springs, fountains, grottoes, and caves, the waters of which were discovered to have delirious or narcotic effects, were selected to be the sites of oracles. At Didyma the vapor of the water affected both the priestess and the person who came to consult her; at Colophon the priest drank of the water of a secret well in a cavern; at Delphi the priestess, called the Pythia, delivered her utterances

from a tripod placed over a chasm from which intoxicating vapors arose. In some of the oracles artificial fumigations were employed. Oracular responses were in general remarkable for obscurity and equivocation, yet they exerted great political as well as religious influence. The responses of the Pythia were not authoritative till they had been written and interpreted by the presiding officer. Delphi, which was the common centre of all the oracles of Apollo, thus became the religious and political metropolis of Greece, and afterward extended its authority over the Romans. The Neo-Platonists referred the origin of oracles to demons, as did also the early Christians. The theurgists sought to revive them and to oppose their power to Christianity. Eusebius and others affirmed that they became silent at the birth of Christ, and assigned as the reason that Christ put an end to the power and the worship of Satan on the earth.—There were 22 oracles for the consultation of Apollo, the most important of which was at Delphi. (See *DELPHI*.) The principal others were that at Abæ in Phocis, which, though burned by Xerxes, continued to be held in repute as late as the reign of Hadrian; that of the Branchidæ at Didyma, near Miletus, which was administered by a family having the hereditary gift of prophecy, received from Cræsus as rich presents as that at Delphi, and was burned by the Persians, but continued to be consulted; that at Clarus, in the territory of Colophon; that at Ismenium, in Boeotia, the national sanctuary of the Thebans, which interpreted signs instead of speaking from inspiration; that at Patara, in Lycia, which was consulted only in winter, and where the prophetess was obliged to wait a whole night in the temple before making communications; and that at Telmessus, also in Lycia, the priests of which interpreted dreams and other marvellous events. The most important oracles of Jupiter were at Olympia in Elis, and Dodona in Epirus. That at Olympia was chiefly consulted by those intending to take part in the Olympic games. That at Dodona was one of the most ancient and celebrated. The responses, in sounds produced by the rustling of the wind in an oak tree ("the speaking oak"), were interpreted in early times by men, but afterward by old women. Its sacred oaks were cut down and its temple demolished by the Ætolians in 219 B. C., but it was consulted until the 3d century A. D. There was also an oracle of Jupiter Ammon in Libya, which was first made known to the Greeks by the Cyrenæans; it was in decay in the time of Strabo. The other divinities were consulted by oracles only on the special departments over which they presided. Thus, Ceres foretold at Patræ in Achaia the fate of sick persons by means of a mirror suspended in a well; Mercury was consulted at Pharæ in Achaia, the person going away after a ceremony, and accepting the first remark that he heard from any one as

the response of the divinity. There was an oracle of Pluto and Proserpine near Nysa in Caria, at which priests divined concerning the remedies for illness by passing a night in a sacred grotto, where they often took their patients with them, who would themselves fall into a prophetic sleep. An annual festival was celebrated there, the young men driving into the cave a bull, which immediately fell dead. Heroes sometimes acted as mediators to reveal the will of Jupiter to men. The spot near Thebes where Amphiaraus was said to have been swallowed up was the seat of an oracular sanctuary. Birds never alighted there, and cattle never grazed in the neighborhood. After a fast the inquirers slept in the temple, and received the revelations in dreams. If they recovered, they were obliged to drop some money into the well of Amphiaraus in the interior of the shrine. Pausanias calls the oracle of Amphiloehus, at Mallus in Cilicia, the most trustworthy known in his time. The oracle of Trophonius, at Lebadea in Boeotia, was held in the highest esteem until a very late period. Several days of preliminary purification were required. The inquirer went into the cave of Trophonius, was received by two boys, bathed in the river Hercyna, and drank of two wells, one of which made him forget all his former thoughts, and the other prepared him for the visions which he was about to have. He then descended by a ladder to the bottom of the cave, and various reports were made of what was there seen, and the responses of the priests were modified according to these reports. There were numerous oracles of Æsculapius, the most celebrated being that of Epidaurus in Argolis. The principal Roman oracles were those of Faunus in the grove of Albunea and on the Aventine hill, where the inquirer received his answer in sleep in prophetic visions; those of Fortuna, where the responses were given by lot; and that of Mars, which in early times existed at Tiora Matiena,*and at which the revelation was given through a woodpecker.

ORAN. I. A province of Algeria, on the Mediterranean, extending along the coast 180 m. from a point E. of the mouth of the Shelliff to near the mouth of the Muluia, and bounded N. E. by the province of Algiers, S. and S. W. by the southern range of the Atlas mountains, and W. by Morocco; area, 111,831 sq. m.; pop. in 1872, 513,492, four fifths of whom were Arabs. Several ranges belonging to the Little Atlas traverse the province in the north. Among the rivers are the Shelliff, the Makra, and the Tafna, all of which empty into the Mediterranean. There are several lakes in the southern parts, and near the capital is Lake Salé or Sebkha. A great part of the soil is fertile, and large tracts are covered with forests. The temperature is in general higher than that of the other provinces of Algeria, but it is somewhat moderated by steady N. W. winds. The province is divided into the

administrative districts of Oran and Mostaganem, and into three military departments. The principal towns on the coast are Oran, Arzeu, and Mostaganem, and in the interior Tlemcen and Mascara. Spanish emigration to this province is rapidly increasing; in 1872 it included 10,000 persons. II. A city, capital of the province, on a bay of the same name, about 210 m. W. S. W. of Algiers; pop. in 1872, 40,674. It is on both sides of the mouth of a small stream called the Wad el-Rakhi, and at the foot of the peak of Ste. Croix or Mergiagio. It is well fortified and in general well built. The principal edifices are a former mosque, now converted into a parish church, another church built by the Spaniards in the time of Charles V., a hospital, a castle, and an arsenal. The city is badly supplied with water, and the country around is arid and barren. The climate, though intensely hot, is generally considered healthy. There is no good anchorage immediately around the town, but Mers el-Kebir, 8 m. distant, has a large and commodious harbor. Here, as in all Algerine ports, trade and industry are in the hands of Jews, Spaniards, and other foreigners. Oran was long a subject of contention between the Spaniards and the Moors. The former, under Cardinal Ximenes, took it in 1509, and retained it till 1708, when the Algerines expelled them. The Spaniards regained it in 1732, but subsequently gave up the town, retaining only the port and castle of Mers el-Kebir. In 1831 the French took possession of the town. A bishopric was established here in 1867.

ORANGE (Lat. *aurantium*), the fruit of *citrus aurantium* and other species or varieties. The

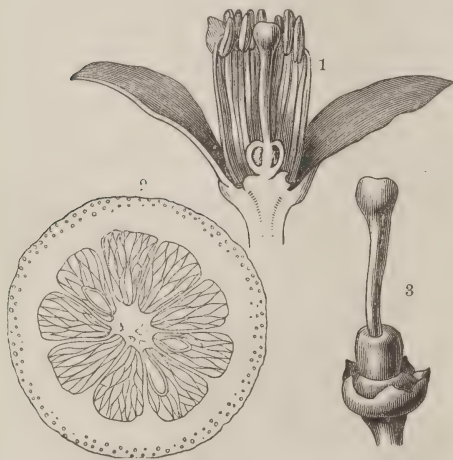


Orange (*Citrus aurantium*).

genus *citrus* and a few other allied genera were formerly grouped together as the orange family (*aurantiaceæ*), but recent botanists have classed them with the rue family, and according to the views of the best authorities the *aurantiaceæ* rank only as a subdivision or tribe of the

rutacea. Besides the orange in its many varieties, the genus *citrus* includes the lemon, lime, citron, bergamot, and shaddock, which are described under their own names; but the description of the genus will be given here. The species of *citrus* are shrubs or small trees, often spiny, with evergreen aromatic leaves, the blade of which is jointed to the petiole (the leaf being properly compound), which is usually winged. The very fragrant flowers are axillary, solitary, or in small clusters, and have four to eight thickish petals; the stamens are numerous (20 to 60), with their filaments more or less united; the single compound pistil has its many-celled ovary surrounded at the base by a conspicuous disk; there is a single style and a knob-like lobed stigma. The fruit is a large thick-rinded berry, separated into numerous divisions by membranous partitions, each containing a few seeds surrounded by large cells filled with juice. The wood is hard, heavy, and close-grained; the leaves, flowers, and rind of the fruit abound in aromatic oils, and the pulp of the fruit contains citric acid. Much confusion exists with regard to the number of species in this genus. Hooker and Bentham limit it to five, while others make more

which is of a deeper reddish color, and its juice is more sour and bitter; all parts of the bitter orange are more strongly aromatic than the corresponding parts in the sweet orange. The orange was introduced into Arabia and Syria, from which it found its way to Italy, Sicily, and Spain, about the 11th century; apparently the bitter orange was first introduced, and there is reason to believe that the sweet was not cultivated until the 15th century. The first importation of oranges into England was in 1290, in a cargo of assorted fruit from Spain. Not only are oranges much disposed to sport, but they are affected by soil, climate, and other conditions; established forms cross with one another, as do the kinds so un-



1. Section of Flower. 2. Section of Fruit. 3. Magnified Pistil.

than that of oranges alone. Galesio, who made a special study of the genus *citrus*, thinks that there are at least four species of orange, while on the other hand Bentham regards all the oranges but as varieties of the wild *citrus medica* or citron. For the present purpose it is convenient to regard the sweet oranges as varieties of *C. aurantium*, and the bitter ones as forms of *C. vulgaris*. All the species are natives of tropical India, and by cultivation have become distributed throughout the warmer portions of the globe. The sweet and bitter oranges are not distinguishable by any important botanical characters; the bitter has a broader wing to the leaf stalk; the fruit has a rougher rind,



Orange with Horned Fruit

like as to be regarded as species; a great number of named forms have resulted from one or another of these causes, some of which are singular monstrosities, such as those with horns, with one fruit produced from the centre of another, or those with the fruit deeply lobed—varieties only known in rare collections, and recorded and beautifully figured in the elaborate work of Risso and Poiteau. The time required after blossoming for the orange to mature varies in different climates; it is at least six months, and sometimes much longer. It is frequently said in books of travel that the flowering and ripening of the fruit are continuous, and that the trees have blossoms, green fruit in all stages, and ripe fruit upon them, at the same time. The tree blooms but once a year, and the presence of ripe fruit at flowering time is due to the custom in some countries of allowing the fruit of the year before to remain upon the tree in order to attain greater perfection. In Italy the fruit that goes into commerce is picked as soon as mature and yet green, while that reserved for home use hangs on the tree all winter, and is in its greatest perfection the following spring and summer.—The Seville orange of commerce is a bitter variety, not

common in our markets; its chief consumption is in making marmalade, and its rind is used as a tonic aromatic in several medicinal preparations; the peel is also candied and used in flavoring puddings and other cookery. This is the *brigarade* of the French, who have several varieties of it, including those with purple and double flowers. The ordinary oranges of commerce are subvarieties of the sweet orange, although they differ greatly in sweetness, and are distinguished by the names of the countries producing them, or the ports whence they are shipped; the Messina, St. Michael's, Maltese, and other oranges from the south of Europe are medium-sized, smooth, rather thin-skinned, and somewhat flattened fruit, with an abundant but not very sweet juice; these are imported in boxes, each orange being wrapped in soft paper. The St. Michael's orange is seedless, and the blood orange of Malta has a crimson pulp. The mandarin or noble orange, which originated in China, is one of the most highly esteemed of all the varieties, and when occasionally offered in our markets it brings the highest price; it is a small, flattened, smooth fruit, of a rich color; the rind, when the fruit is fully ripe, separates spontaneously from the pulp, which is exceedingly rich and agreeable; this is so much unlike other oranges that it has



Mandarin Orange.

been regarded as a distinct species and called *citrus deliciosa*. In China it is held in high regard and used as presents to the mandarins; it was introduced into Europe early in the present century, and is now cultivated in Algeria, the Azores, Brazil, and other countries. The Tangerine oranges are regarded as subvarieties of the mandarin; the small Tangerine is only the size of an English walnut, while the large is twice that size, and they incline to a pyriform shape. The Havana oranges, which also come from other parts of the West Indies, are large, often rough-skinned, and very sweet; as they are imported in bulk, they are picked in a very green state, and are rarely seen in the

market in their best condition. A similar orange from Florida, having a shorter voyage and gathered when more nearly ripe, is generally of a better quality. The navel orange of Brazil, rarely offered for sale, is of superior excellence; it is usually seedless, very sweet, and has often a small protuberance at the upper end, from which it receives its name. The myrtle-leaved orange, which can hardly be regarded as a variety of commerce, is sold by the florists for a table decoration; it is a dwarf sweet orange with small leaves, and flattened fruit 1 to 3 in. in diameter; it is a profuse bearer, producing fruit when only 4 to 6 in. high, which remains on for several months.—The chief use of the orange is as a dessert fruit, and to afford a refreshing beverage in fevers, but the useful products of the tree are not confined to the ripe fruit. The yellowish fine-grained wood is used for inlaid work and for making small turned articles; and straight shoots of suitable size, with the bark on, are imported for walking sticks. The leaves of the tree are bitter and aromatic, especially in the bitter orange. In the lemon-growing districts of the Mediterranean the lemon trees are grafted upon orange stocks; these put forth vigorous shoots, which are allowed to grow several feet long, when they are cut and taken to the distiller, who prepares from them an aromatic water called *eau de naphre*, or extracts their essential oil, known as essence of *petit grain*; these shoots are also used for walking sticks. The true essence of *petit grain* is distilled from the small unripe fruits which fall during the summer; these are carefully gathered for the distiller, and give a volatile oil of a flavor superior to that from the leaves; the essence produced from the bitter orange is more valuable than that from the sweet, and that from the berries is preferred to the product of the leaves; these oils are used in the manufacture of eau de cologne and other perfumes, and are but little known to our commerce. The flowers of the orange, on account of their charming fragrance and pure whiteness, are considered essential to the bridal wreath, and the trees are cultivated by florists solely for their flowers; the bitter orange is preferred, as its flowers are more fragrant, and there are double and free flowering kinds especially suited for this use. By distillation with water orange flowers afford an essential oil, the essence or oil of *neroli*, and the water from which this is separated is sold as orange-flower water. The oil received its name from having been used in the 17th century by Anne Marie, wife of the prince of Nerola, or Neroli, as a perfume for her gloves. It possesses in a concentrated degree the fragrance of the flowers, and is much used in perfumes of various kinds; orange-flower water is employed in pharmacy to flavor mixtures, and sometimes in cooking. The oil of orange peel, or oil of orange, as it is known in commerce, is contained in the rind of the fruit in vesicles large

enough to be visible without a glass, and its presence and inflammable character are easily shown by squeezing a fragment of the fresh peel near the flame of a lamp; though a volatile oil, it is, like that of the lemon, obtained by pressure; one of the methods is to squeeze strips of the peel by hand and receive the oil from the ruptured vesicles in a fragment of sponge, which when saturated is wrung out and the oil received in a bowl, where it separates from the water which accompanies it. In France the oil from the bitter orange is known as the *essence de bigarade*, and that from the sweet as *essence de Portugal*. The use of the dried peel of the bitter orange has already been noted. A minor product of the orange tree, much less known now than formerly, is the issue peas; under this name the dried unripe fruits, turned smooth in a lathe, are kept in the shops, and are used to keep up the discharge from an issue, their odor making them preferable to ordinary peas, sometimes used for the same purpose.—The methods of cultivating the orange differ but little. In the south of France the tree probably receives a more systematic culture and careful pruning than elsewhere. In some localities the trees are multiplied by a kind of layering: a branch has a circle of bark removed and a mass of earth bound over the wound; this earth is kept moist until roots have formed in it, when the branch is severed and planted in the ground; but the general method is to raise stocks from seeds and bud them with desirable sorts, and it requires about 15 years from the time of sowing the seed for the tree to come into full bearing. In this country the orange is cultivated as an object of profit in Florida, Louisiana, and southern California; Texas and some other states produce a small number for home consumption. In various parts of Florida, south of lat. 30°, especially along the St. John's and Indian rivers, there are immense groves of wild oranges; Bartram in his "Travels" mentions having seen in 1763, near Mosquito inlet, a ridge about half a mile wide and 40 m. long, which was one dense orange grove, interspersed with magnolias and a few other trees. So thoroughly established is the tree, and so generally is it distributed, that many have supposed it to be indigenous; but botanists who have investigated the matter regard it as an instance of remarkable naturalization, and the trees as having descended from those which are known to have been introduced by the early Spanish colonists. This wild orange is bitter, often called in Florida the bitter-sweet, and so exceedingly fruitful that a tree in full bearing is an object of great beauty; the wild orange furnishes stocks on which to bud other varieties, and the fruit is used to make marmalade. In Florida there are three methods of establishing an orange grove: to clear up a wild grove, removing all trees not needed, and budding with sweet fruit those that remain; to take up young wild trees and set them in

prepared ground, and there bud them; and to raise stocks from seed, bud them in nursery rows, and when of sufficient size set them in the plantation, as is practised with other fruit. Each method has its advocates, and it is probable that the last named, though apparently slower, gives ultimately better results. Some maintain that there is no need of budding stocks raised from the seeds of sweet oranges, but that the fruit reproduces itself perfectly from the seed. Almost any soil that is not a heavy clay suits the orange, but in a light sandy one fertilizers must be applied. Severe frosts are fatal to the tree; in 1835 occurred a frost of such severity as to kill not only cultivated trees, but those in the wild groves. Insects of various kinds, especially a *coccus* or scale insect, are destructive; a kind of fungus affects the fruit and leaves, and there is another disease, not well understood, which causes the death of young growing shoots. None of these are regarded as formidable if the trees have proper and timely attention, but if neglected the value of the grove is soon destroyed. The Jesuit missionaries early introduced the orange into the gardens of the mission stations of southern California, and some of these, notably that of Los Angeles, were in full bearing at the time the country came into our possession. The American settlers soon extended the culture of oranges, lemons, and such fruits, and it is now one of the principal industries of Los Angeles and its vicinity, and has extended to other parts of the state. In the season of 1871-'2 the orange crop of Los Angeles county was stated at 5,000,000, worth on the average \$20 a thousand. In England orange culture became popular in the 17th century, and an orangery was regarded as an important part of the establishments of the wealthy; indeed, at that time the orange was the leading tender exotic in cultivation; the trees were imported from Italy and grown in boxes or tubs, which were placed out of doors in summer, and in winter taken to the orangery, which was usually a building of some architectural pretensions, with a ceiled roof and glass only upon the sides and ends. Such buildings have long since been replaced by those entirely of glass. By giving the plants shelter in winter, where they will be protected from freezing, yet not have heat enough to induce growth, but sufficient light to keep them in health, the orange can be enjoyed as an ornamental tree in northern climates; but in order to have satisfactory crops of fruit it must have a heated structure especially devoted to it.—The imports of oranges into the United States from the Mediterranean in 1874 were 751,560 cases, of which 349,701 cases, containing 131,555,970 oranges, were received at New York, with a loss of 33 per cent. The receipts at New York from the West Indies in the same year were 21,540,130 oranges, on which the loss was 45 per cent.—There is but little recent literature upon orange culture; a useful pamphlet, "Orange Culture

in Florida," by J. H. Fowler, was published in 1873 at Jacksonville, Fla. The standard European works are *Traité du génus citrus*, by Gallesio (Savona, 1818), and *Histoire naturelle des orangers*, by Risso and Poiteau. This most elegant work, with over 100 beautifully colored engravings, was originally issued at Paris in 1818, and within a few years has been republished under the editorship of the distinguished arboriculturist Du Breuil.

ORANGE, the name of counties in seven of the United States. **I.** An E. county of Vermont, bordering on the Connecticut river, and watered by various small streams; area, about 650 sq. m.; pop. in 1870, 23,090. It has an uneven surface, and the eastern range of the Green mountains crosses the N. W. part; the soil is moderately fertile. It contains great quantities of iron ore and granite and some lead ore. The Connecticut and Passumpsic Rivers railroad traverses the eastern margin, and the Vermont Central crosses the S. W. corner. The chief productions in 1870 were 51,952 bushels of wheat, 174,261 of Indian corn, 316,148 of oats, 76,826 of buckwheat, 490,715 of potatoes, 1,062,104 lbs. of butter, 105,285 of cheese, 498,749 of wool, 816,921 of maple sugar, and 86,544 tons of hay. There were 5,778 horses, 10,661 milch cows, 3,912 working oxen, 9,634 other cattle, 77,816 sheep, and 3,366 swine; 10 manufactories of agricultural implements, 12 of carriages and wagons, 3 of paper, 12 of saddlery and harness, 3 of woollen goods, 10 flour mills, and 19 saw mills. Capital, Chelsea. **II.** A S. E. county of New York, bordered S. W. by New Jersey and E. by the Hudson river, and drained by the Wallkill and Shawangunk rivers; area, 838 sq. m.; pop. in 1870, 80,902. The Shawangunk mountains cross the N. W. corner, and a range of precipitous heights, having an elevation of from 1,000 to 1,500 ft. and known as the Highlands, are toward the S. E. on the Hudson river. The remainder of the surface is chiefly rolling upland. It is noted for its excellent grazing and fine dairy produce, nearly half the improved land being in pasture. The Erie railway and its Newburgh and other branches pass through it. The chief productions in 1870 were 103,196 bushels of wheat, 66,625 of rye, 459,343 of Indian corn, 412,652 of oats, 28,335 of buckwheat, 324,732 of potatoes, 1,403,409 lbs. of butter, and 119,265 tons of hay. There were 10,498 horses, 43,830 milch cows, 7,859 other cattle, 6,980 sheep, and 13,323 swine; 48 manufactories of carriages and wagons, 11 of cheese, 14 of furniture, 8 of castings and 4 of pig iron, 11 of tanned and 11 of curried leather, 11 of machinery, 27 of saddlery and harness, 5 of sash, doors, and blinds, 30 of tin, copper, and sheet-iron ware, 9 of woollen goods, 14 distilleries, 5 saw mills, and 25 flour mills. Capitals, Newburgh and Goshen. **III.** A N. E. county of Virginia, bounded N. W. by the Rapidan and drained by branches of the North Anna river;

area, about 250 sq. m.; pop. in 1870, 10,396, of whom 5,458 were colored. Its surface is somewhat hilly, and the soil generally fertile. The county is traversed by the Washington City, Virginia Midland, and Great Southern railroad. The chief productions in 1870 were 117,576 bushels of wheat, 185,604 of Indian corn, 83,286 of oats, 58,938 lbs. of butter, and 46,460 of tobacco. There were 1,942 horses, 1,791 milch cows, 2,673 other cattle, 3,372 sheep, and 5,553 swine. Capital, Orange Court House. **IV.** A N. county of North Carolina, watered by the head waters of the Neuse and several small streams; area, about 700 sq. m.; pop. in 1870, 17,507, of whom 6,420 were colored. It has an undulating surface and fertile soil. The North Carolina railroad intersects it. The chief productions in 1870 were 89,023 bushels of wheat, 193,161 of Indian corn, 92,061 of oats, 18,157 of Irish and 18,559 of sweet potatoes, 179,995 lbs. of butter, 530,442 of tobacco, and 383 bales of cotton. There were 2,006 horses, 3,216 milch cows, 3,404 other cattle, 7,171 sheep, and 14,618 swine. Capital, Hillsborough. **V.** A central county of the peninsula of Florida, bounded E. by the St. John's river; area, 2,450 sq. m.; pop. in 1870, 2,195, of whom 198 were colored. It has a level surface, covered with extensive pine forests and savannas, with many small lakes and swamps interspersed. The chief productions in 1870 were 16,213 bushels of Indian corn, 18,490 of sweet potatoes, 306 bales of cotton, and 4,856 gallons of molasses. There were 254 horses, 3,962 milch cows, 10,827 other cattle, and 3,693 swine. Capital, Orlando. **VI.** A S. E. county of Texas, separated from Louisiana on the east by the Sabine river and bounded S. and W. by the Neches, which meets the former at Sabine lake on the S. E. corner; area, 350 sq. m.; pop. in 1870, 1,255, of whom 250 were colored. It has a nearly level surface, about half of which is covered by a heavy growth of timber, principally pine and cypress, and a portion is wet land well adapted to the cultivation of rice. The chief productions in 1870 were 8,720 bushels of Indian corn, 5,995 of sweet potatoes, and 67 bales of cotton. There were 504 horses, 725 milch cows, 3,157 other cattle, 782 sheep, and 631 swine. Capital, Orange. **VII.** A S. county of Indiana, watered by Lost river and Patoka creek; area, about 400 sq. m.; pop. in 1870, 13,497. The S. part is hilly, and the N. undulating. The uplands are heavily timbered, and the river bottoms very fertile. The Louisville, New Albany, and Chicago railroad intersects the N. E. corner. The chief productions in 1870 were 156,622 bushels of wheat, 498,740 of Indian corn, 145,600 of oats, 25,532 of potatoes, 25,050 lbs. of tobacco, 45,495 of wool, 245,381 of butter, and 3,904 tons of hay. There were 4,798 horses, 3,724 milch cows, 6,645 other cattle, 17,390 sheep, and 25,164 swine; 7 manufactories of hones and whetstones, 1 of marble and stone work, 3 of sad-

dlery and harness, 3 flour mills, and 6 saw mills. Capital, Paoli.

ORANGE, a city of Essex co., New Jersey, on the Morris and Essex division of the Delaware, Lackawanna, and Western railroad, 3 m. N. W. of Newark, and 12 m. W. of New York; pop. in 1870, 9,348. As often used in a general sense, the name includes, besides the city, the township of East Orange (pop. in 1870, 4,315) and portions of the townships of South Orange (pop. 2,963) and West Orange (pop. 2,106), composing the original township of Orange, set off from Newark in 1806. The average altitude of Orange and East Orange is about 160 ft. above tide. Their surface is gently rolling, and is drained by small tributaries of the Passaic and Raritan rivers. A succession of parallel swells, running N. E. and S. W., affords a variety of fine building sites, terminating at West Orange in Orange mountain, which has a uniform height of about 650 ft., with a broad crest available for residences. On its E. slope is Llewellyn park (50 acres), which is governed by an association of its residents, and under certain restrictions is open to the public. The region is very healthy, and is a favorite place of residence for people doing business in New York. The city has a police force and a paid fire department, and the principal streets are paved and lighted with gas. In the N. part is the beautiful Rosedale cemetery of 50 acres. The manufacture of hats and shoes is the chief industry. There are four weekly newspapers (one German). Horse cars run to Newark. Within the limits of the original township there are six railroad stations, a national and two savings banks, seven hotels, two post offices, six public school buildings, two public libraries, a hospital, an orphan asylum, and 22 churches. At South Orange are Seton Hall college and ecclesiastical seminary (Roman Catholic), the former having in 1874-75 20 instructors, 100 pupils, and a library of 8,000 volumes, and the latter 4 professors and 34 students.—The township of Orange received a town charter in 1860, and in the three following years East Orange and parts of South Orange and West Orange were set off. The town of Orange became a city in 1872.

ORANGE (anc. *Arausio*), a town of France, in the department of Vaucluse, formerly capital of the principality of Orange, about 3 m. E. of the Rhône and 13 m. N. of Avignon; pop. in 1866, 10,622. The streets are narrow, but the town is pretty well built, has fine fountains, and contains a cathedral and several other churches. There are also Roman remains, the most important of which is a triumphal arch 60 ft. high. Linen, cotton, and silk are manufactured, and there is trade in corn, wine, oil, and dyestuffs.

ORANGE, Principality of, formerly an independent seignior of S. E. France, 12 m. long by 9 broad, now included in the department of Vaucluse. Its origin is traced to the time of Charlemagne, and it was held in succession

by four houses: 1, that of Giraud-Adhémar, which became extinct in 1174; 2, that of Baux, which ruled it till 1393; 3, that of Châlon, which ended in 1530 with the celebrated Philibert, one of the greatest generals of the age; 4, that of Nassau-Dillenburg, which acquired full possession in 1570, and kept it until the death of William III., king of England, without issue, in 1702. Many competitors claimed the vacant estate, Frederick I. of Prussia and Prince John William Friso of Nassau-Dietz being the foremost. Each of the several pretenders assumed the title of prince of Orange; but after a protracted contest the principality was ceded to France by the treaty of Utrecht (1713), and has since been a part of that country. The princes of Nassau-Dietz nevertheless were allowed to style themselves princes of Orange, and since their accession to the throne of Holland that title is given to the heir apparent.

ORANGEBURG, a S. W. county of South Carolina, between the Santee and Congaree rivers on the N. E. and the Edisto on the S. W., drained by the North Edisto and other streams; area, about 900 sq. m.; pop. in 1870, 16,865, of whom 11,156 were colored. The surface is uneven; the soil is moderately fertile. It is traversed by the South Carolina railroad. The chief productions in 1870 were 8,286 bushels of wheat, 263,739 of Indian corn, 31,846 of sweet potatoes, 6,449 bales of cotton, and 952,378 lbs. of rice. There were 1,527 horses, 1,077 mules and asses, 2,521 milch cows, 5,754 other cattle, 2,973 sheep, and 15,009 swine. Capital, Orangeburg Court House.

ORANGEMEN, a secret political society of the British empire, whose official designation in its own records is "The Loyal Orange Institution." It is composed exclusively of Protestants, and its professed objects are to support and defend the reigning sovereign of Great Britain, the Protestant religion, the laws of the country, the legislative union of Great Britain and Ireland, and the succession to the throne in the present royal family so long as it remains Protestant. They associate also in honor of King William III., prince of Orange, whose name they bear, "as supporters of his glorious memory." Members are admitted by ballot, six sevenths of the votes cast being necessary to admission. Every member must belong to a subordinate lodge, and can only be admitted on proof that he is a Protestant of known loyalty and over 18 years of age. The association is divided into five orders or degrees, the first of which is the orange, and the fifth and highest the scarlet degree. The officers of the lodge must be of the scarlet degree, and consist of a master, deputy master, secretary, treasurer, and five committeemen, who hold office for one year. Any member who marries a Roman Catholic must be forthwith expelled. Three or more subordinate lodges constitute a district lodge, of which the officers bear the same titles as the officers of the lower lodges with the prefix

of "district." The district lodge meets four times in a year. Next above the district lodges are the county grand lodges, whose officers bear the titles already enumerated with the prefix of "grand," and are elected by the officers of the district lodges in the county. The county grand lodge meets twice a year. Finally there is in each of the three kingdoms of Great Britain and in Wales a grand lodge, which meets twice a year, and consists of the above mentioned "grand" officers, and of a grand committee elected by the officers of the county grand lodges; and these grand officers also constitute the imperial grand lodge, at the head of which is the grand master of the empire, "who is its chief and supreme head. His office is permanent and uncontrolled." There are also grand lodges in the principal colonies. A collateral order called the "Grand Black Order of Orangemen," or "Royal Black Knights of the Camp of Israel," exists within, but separate from, the Orange institution, to which no person is admitted who has not taken the higher degrees of the exterior society, or who does not profess to believe in the holy Trinity. Its grand, county, district, and subordinate lodges are called chapters and preceptories, and the individual members are called knights.—The Orange institution was founded in the north of Ireland in 1795, ostensibly to counteract the Roman Catholic secret associations called "the defenders" or "ribbonmen." These two opposite associations were soon involved in fierce hostility with each other, and nearly all the peasantry belonged to one or the other. Whenever the opposite factions met in any considerable numbers, insults were exchanged and riots often ensued. The law was powerless against them, because witnesses were intimidated, and jurymen sometimes refused to convict culprits belonging to their own order. In 1828 immense assemblages of the Orangemen and of the "Catholic association" gathered tumultuously in the north of Ireland, and blood was shed. In 1829 the Orange celebration of the anniversary of the battle of the Boyne, July 12, caused bloody conflicts, and the military with difficulty suppressed the disturbances. In 1835 a parliamentary investigation detected Orange lodges in 34 regiments of the army; and in 1836 the imperial grand master, the duke of Cumberland, was compelled to dissolve the institution in Ireland. It was revived in 1845, and is still extensively diffused in the British islands, though its processions are there forbidden by law. It was introduced into British America in 1829, and in 1861 it had 1,200 lodges and about 150,000 members. Its processions there are not illegal, and its political influence is very great. Much excitement was occasioned by the attempt in 1860 to compel the prince of Wales during his progress through the provinces to recognize the order and to pass under its arches and banners, a recognition steadfastly refused by the prince

and his suite. In 1871 the Orangemen of New York and its vicinity celebrated the 12th of July by a procession which was escorted by the police and by a considerable body of militia. Some Irish Catholics attacked the procession as it passed through 8th avenue, and were repulsed by the military with the loss of about 60 lives among the assailants.

ORANGE RIVER. See CAPE COLONY.

ORANGE RIVER REPUBLIC. See BOERS.

ORANG-OUTANG (*pithecus*, Geoffr., or *simia*, Linn. and Illig.), the common name of the large tailless anthropoid apes of S. E. Asia and the islands of Borneo and Sumatra. Some details have been given regarding the oranges under APE and CHIMPANZEE. The orang most commonly seen in menageries is the *P. satyrus* (Geoffr.), of which the adult has been described as the *P. Wurmbeii*, the pongo of authors and the *mias* of the natives of Borneo. The pongo or adult orang is more powerful and less anthropoid than the chimpanzee (*troglodytes niger*, Geoffr.); it represents in Asia the gorilla of Africa, and varies in height from 5 to 7 ft. The forehead is contracted, sloping directly backward, with no projecting superciliary ridges; the occiput is flattened, the canines large, jaws powerful, zygomatic arches strong and expanded, and cranial ridges largely developed; the crown is less flat than in the chimpanzee; the brain cavity of the adult is very little larger than at the period of the first permanent molars, the greater size of the cranium depending on a thickening of the walls and the development of the temporal ridges; the latter commence at the external angular process of the frontal bone, and pass upward, inward, and backward to meet at the



Orang-outang (*Pithecus satyrus*).

junction of the sagittal and coronal sutures, the two including a smooth triangular portion of the frontal; the interparietal crest is about half an inch high, as in the large carnivora, dividing at the vertex, and passing behind the lambdoidal suture to the mastoid ridge,

and a rough prominence continues from the point of divarication half way down the occiput. As compared with the chimpanzee, it comes nearer man in the small portion of the wing of the sphenoid which reaches the parietal, separating the frontal from the temporal, though this character does not hold good in all races of men nor always in the orang; the occipital foramen is further back, and its condyles are nearer together in front, with double anterior condyloid foramina; from the greater development of the canines, the incisive foramina are further back; the intermaxillary sutures are not obliterated until the permanent teeth are almost fully developed; the single nasal bone is flat, with no projection beyond the nasal processes of the upper jaw; the inter-orbital space is relatively narrower; the upper jaw has three infra-orbital foramina instead of one, and is larger; the incisors project more obliquely forward; there is a greater height and breadth of the rami of the lower jaw, and greater depth of symphysis. The teeth are in number the same as in man, the chimpanzee, and gorilla, the incisors and canines especially being relatively larger. The spinous processes of the cervical vertebræ are simple and very long, for the muscular attachments rendered necessary by the backward position of the occipital foramen, the great development and weight of the face, and the general anterior inclination of the vertebræ themselves; the spinal column has one general curve behind from the atlas to the beginning of the sacrum, where there is a slight curve in the opposite direction; the dorsals are 12 as in man, the chimpanzee having 13; the lumbar are four, with shorter spines; the sacrum consists of five bones, and is longer, narrower, and straighter than in the chimpanzee; the coccygeal bones are three, ankylosed together, but not to the sacrum. Continuing the comparison with the chimpanzee, the ilia are more expanded and flatter, and the ischia are less extended outward, making the lower part of the pelvis narrower; the superior pelvic opening is nearly a perfect oval; the chest is ample, as large as a man's, the transverse greater than the antero-posterior diameter; the ribs are narrower and less flattened; the sternum short and wide, composed, below the first bone, of a double series of seven or eight small bones, always distinguishable in the young animal, but not in the chimpanzee; the clavicles very little curved; the scapulæ broad and short. The principal difference is in the relative length of the upper and lower limbs; the arms reach to the heel; in the forearm there is greater space between the bones, owing to the outward curve of the radius; the bones of the hand are elongated, those of the thumb slender and short, not reaching to the end of the metacarpal of the forefinger; proximal phalanges curved for easier prehension and climbing, and the last row not expanded for a wide sensitive bulb of a finger. The femur has no *ligamentum teres*,

giving greater mobility and less solidity to the motions of the hip joint, useful in climbing, but rendering the gait on the ground awkward and shuffling; the bones of the leg are short, with greater space between them, owing to the inward curve of the tibia; the foot is turned more inward, and the os calcis does not project so far back; the phalanges much elongated, the hind thumb not reaching to the condyle of the next metatarsal; it resembles a hand more than a foot. The sutures are obliterated in the adults. The large canines of these anthropoid apes bear no relation to their food, being used principally as weapons of defence against the larger carnivora, which their great strength enables them to cope with; the smaller the species and the more easily concealed, the less developed are the canines. The capacity of the adult male orang skull is 26 cubic inches, of the female 24, considerably less than in the gorilla, and about the same as in the chimpanzee; in the young, up to the age of about five years, the facial angle is 60° ; the extremities preserve the proportions of a six-months human fœtus, while in the chimpanzee they are those of a yearling infant. The numerous resemblances to the human structure which have served as arguments for progressive animal development have always been taken from immature specimens of these anthropoid apes, in which the facial angle, teeth, and shape and relative size of cranium assume human proportions, which are lost as the animal advances in age; the docility and gentleness of the young give place to obstinacy and ferocity in the old, as the cerebral development becomes relatively less. —The Bornean pongo has long loose hair of a deep fuscous color, approaching in some parts to black, the adult male having large dermal fatty protuberances over the cheek bones, not found in the Sumatran species; the younger specimens, both in Borneo and Sumatra, are more ruddy brown. In the immature specimens, which are the best known, the head is pear-shaped, expanding from the chin upward; the eyes close together; the external ears small; the nose confluent with the face, with nostrils but slightly elevated; mouth projecting, with large gape and very narrow lips; the abdomen protuberant; the hair on the forearm reversed. They are fond of low marshy regions, well wooded, their whole organization being fitted for progression on trees; they seldom move far on the ground, and then on all-fours or by swinging the body awkwardly forward between the arms supported by the bent knuckles; they build a kind of nest in trees, where they spend the night, leaving it late in the morning when the sun has dispersed the dew and thoroughly warmed the air; they do not live in society, except when a pair have a family in charge; the food consists of fruits, nuts, tender plants, leaves, and shoots, and is entirely vegetable in a state of nature; the natives say they always attack and are attacked by the crocodile (*C. biporcatus*). In captivity the disposition is

mild and affectionate, and the deportment grave and often melancholy; the intelligence and powers of imitation are considerable, and they get to be fond of the varied food of man, and especially his drinks, as ardent spirits and coffee. The Sumatran orang has been described as a distinct species, as *P. Abelii* or *bicolor* (Geoffr.); it is of large size and of a reddish brown color. A smaller and more anthropoid species in Borneo has been named *P. morio* by Owen; it is about 4 ft. high, and 6½ ft. between the ends of the outstretched arms; the ridges of the skull are rudimentary, passing from the external angle of the frontal bone, slightly converging but not meeting, and behind the coronal suture soon subsiding to the level of the skull; the canines are smaller, and are related to differences in the cranium; it may be, according to Owen, a now permanent, though dwarfed, variety of *P. satyrus*.

ORANIENBAUM, a town of Russia, on the gulf of Finland, in the government and 20 m. W. of the city of St. Petersburg, opposite Cronstadt. It is celebrated for its picturesque situation, and for an imperial palace, with a magnificent park, built by Prince Menshikoff, a favorite of Peter the Great, which subsequently became the property of the crown and the favorite residence of Peter III. The palace consists of three buildings, connected by colonnades and surrounded in every direction by gardens and orangeries (*Oranienbäume*), whence the name of the town. A canal connects the pleasure grounds directly with the gulf of Finland. In a neighboring grove, in the utmost seclusion, is a little château known as the Solitude. The road from Oranienbaum to St. Petersburg is lined almost continuously with parks and villas, and passes the imperial summer palaces Stribelna and Peterhof.

ORATORIANs. **I.** A religious society founded by St. Philip Neri. (See NERI, FILIPPO DE'.) In 1551 Neri associated with himself several young priests, and gradually matured the plan of the "Congregation of the Oratory." The congregation was formally established in 1564, confirmed in 1575 by Pope Gregory XIII., and again by Paul V. in 1612. During the lifetime of St. Philip the congregation extended through all parts of Italy, new houses being established at Florence, Naples, Lucca, Padua, and many other places. Neri remained the superior of the congregation till 1593, when he resigned, and was succeeded by Baronius. The congregation was chiefly confined to Italy till 1848, when, at the suggestion of Bishop (afterward Cardinal) Wiseman, two houses of the Oratory were established in England by John Henry Newman, one in London, and the other at Edgbaston near Birmingham. **II.** An order founded in France in 1611 by the abbé (afterward Cardinal) Bérulle, and confirmed by a bull of Paul V., May 10, 1613, under the name of "Priests of the Oratory of Jesus." Their aim was the restoration of ecclesiastical discipline among the clergy. They spread rap-

idly in France and elsewhere, and during the lifetime of their founder houses were established at Madrid, Rome, and Constantinople, and in Savoy and the Netherlands. The congregation soon became distinguished for the great number of eminent scholars among its members. They were deeply involved in the Jansenist controversy, and at the election of several superiors general they were divided into a Jansenist and an anti-Jansenist party. After the outbreak of the French revolution a considerable number of Oratorians joined the constitutional church. The congregation itself, with all other religious associations, was dissolved. On Aug. 16, 1852, six French priests, under the guidance of the abbé Petétot, undertook to restore the French Oratory. In 1864 the new congregation, under the title of the "Oratory of Christ our Lord and of Mary Immaculate," was approved by the pope. It received its chief illustration from Fathers Gratre and Perraud, and is known as the Oratory of the Immaculate Conception.

ORATORIO (Lat. *oratorium*, a small chapel), a sacred musical composition, consisting of airs, recitatives, duets, trios, choruses, &c., with full orchestral accompaniment. The subject is generally taken from Scripture, and the text, which is seldom dramatic in form, is sung and recited without action or any of the adjuncts of theatrical representation. The oratorio is a modified form of the mystery or religious tragedy of the middle ages, adapted to the services of the church. Its origin has generally been ascribed to St. Philip Neri, who in 1564 founded the congregation of the Oratory in Rome, one of the objects of which was to deter young people from profane amusements by rendering religious services attractive. They began by the introduction of canticles and spiritual songs and choruses; and afterward Scripture songs and incidents were formed into dramatic poems, set to music by the best composers, and sung with instrumental accompaniment before and after the sermon. In the present signification of the term, however, oratorios were not produced until about the middle of the 17th century. They speedily became popular in Italy, where they were regularly performed in churches during the carnival, and gradually became a recognized form of musical composition in many parts of Europe. In Germany they have been cultivated by eminent composers from Bach to Mendelssohn; and in England for a century and a half they have proved perhaps the most popular species of music extant. In the latter country all the great works of Handel, the most eminent composer of oratorios, including "Samson," "Israel in Egypt," "Saul," "Jephthah's Daughter," and the "Messiah," were originally produced. In some cities of the United States the taste for this kind of music has been fostered by societies of long standing. In Italy oratorios are performed exclusively in churches.

ORATORY, the art of public speaking. Aristotle distinguished three kinds of oratory: demonstrative, deliberative, and judicial. The first included panegyrics, invectives, and academic discourses; the second included legislative and other debates on public policy, moral lectures, and all instructive oratory; and the third included pleading, accusation, and defence, as before a court of justice. The same philosopher divides rhetoric into the departments of persuasion, language or expression, and arrangement. He makes the oration to consist of introduction, proposition, confirmation, and peroration; and most writers on oratory have adopted his division. Oratory comprises the departments of rhetoric or composition and elocution, the latter including the tones of the voice, utterance, enunciation, and gesture, to which belongs the expression of the countenance.—The history of oratory goes back to the earliest days. The Old Testament contains the valedictory of Joshua, and the able address of King Abijah to the armies of Judah and Israel on the eve of battle. Homer records speeches of the Greek heroes which may be called orations. The golden age of Greece is the age of her greatest orators, Pericles ably heading the list, which culminates in Demosthenes. Roman oratory reached its height in Cicero, and declined with the decline of Roman liberty. Ancient orators were generally ignorant of law, the Greeks being assisted by practitioners called *pragmatici*, while the Romans generally intrusted the maintenance of the law to their professed jurists. Classic oratory adopted a minute system of rules reaching every tone and gesture. Greek eloquence was more simple and severe, the Latin more florid. In neither was there any pretence to humor or wit. In the 4th and 5th centuries the preachers of Christianity had a wide reputation for eloquence, Chrysostom being generally given the foremost place. The middle ages show only the eloquence of Peter the Hermit, Abélard, Bernard, Francis of Assisi, Thomas Aquinas, and some other ecclesiastics; but the reformation brought out the rough but powerful preaching of Luther contrasted with the gentle dignity of Melancthon. The highest eloquence of the next generation is found in the Catholic pulpit of France, where Bossuet, Fénelon, Massillon, and Bourdaloue raised pulpit oratory to the very highest place. The 18th century witnessed the wonderful parliamentary oratory of Chatham and Pitt, Sheridan, Burke, and Fox. This century saw also the great religious awakening under Wesley, and both England and America were stirred by the preaching of Whitefield. The American revolution brought out the eloquence of James Otis and Patrick Henry, and the French revolution inspired and was stimulated by Mirabeau and Vergniaud. More recent times have been distinguished by the eloquent sermons of Robert Hall and Thomas Chalmers, and the political oratory of Lord

Brougham and Canning, Mr. Gladstone and John Bright, Berryer and Guizot, O'Connell and Kossuth. In the United States the senatorial speeches of Henry Clay, John C. Calhoun, and Daniel Webster may be compared with the most perfect orations of any time.

ORBIGNY. I. Alcide Dessalines d', a French naturalist, born at Coueron, Loire-Inférieure, Sept. 6, 1802, died at Pierrefitte, near Paris, June 30, 1857. He was educated at La Rochelle, and in 1826 he was sent by the government to South America, which he explored for eight years, from Brazil and Peru to Patagonia. He collected many valuable historical manuscripts, 36 vocabularies of American languages, 7,000 species of animals, a large portion of which were entirely new, and 2,500 species of plants. He published *Voyage dans l'Amérique du Sud* (9 vols. 4to, 1834-'52), *Paléontologie française* (14 vols., 1840-'54), and other important works on natural history and on palæontology, on which he lectured in the museum of natural history from 1836 to 1853.

II. Charles Dessalines d', a French geologist, brother of the preceding, born at Coueron, Dec. 2, 1806. For the past 40 years he has been attached to the museum of natural history in Paris, and he has edited, in conjunction with others, the *Dictionnaire universel d'histoire naturelle* (24 vols., Paris, 1839-'49; abridged ed., 2 vols., 1844). Several of his other works relate to geology.

ORCA. See GRAMPUS.

ORCAGNA, or **Orgagna** (ANDREA DI CIONE), an Italian artist, born in Florence in the early part of the 14th century, died in 1375 or 1389. He was the son of a Florentine sculptor and goldsmith named Cione, and acquired the surname of L'Archagnuolo (the archangel), which was contracted into Orcagna. He was instructed by his father and an elder brother, Bernardo, a painter. His most memorable frescoes are the series on the north wall of the Campo Santo at Pisa, representing "The Triumph of Death," "The Last Judgment," and "Hell." These have been greatly injured by time and neglect. They were profoundly studied by succeeding painters, and Michel Angelo and Raphael borrowed largely from the attitudes and arrangements of Orcagna. As a sculptor and architect Orcagna, according to Vasari, was even greater than as a painter. One of his most celebrated productions was the tabernacle of the Virgin in the church of San Michele at Florence, a pyramidal altar of white marble, one of the figures on which represents the artist, and is inscribed with his name and the date (1359). The church was also built from his designs; but his masterpiece in architecture was the Loggia de' Lanzi in Florence.

ORCHARDSON, William Q. See supplement.

ORCHELLA. See LITMUS.

ORCHESTRA (Gr. ὀρχήστρα, from ὀρχεῖσθαι, to dance), that part of the Greek theatre in which the chorus performed its dances and evolutions. It was circular, except that a segment was

appropriated to the stage, in front of the spectators, and surrounded by steps. In modern theatres the orchestra is the space between the audience and the stage allotted to the musicians; and in concert rooms it is a raised platform occupied by both vocal and instrumental performers. Previous to the commencement of the 18th century the instrumental performers in theatres were placed in a box on the side of the stage and out of view of the greater part of the audience.—The term orchestra is more commonly applied to a body of instrumental performers in which the violin family predominates. A body of musicians using principally wind instruments is popularly called a band. One of the earliest examples of the composition of an orchestra is afforded by Rinuccini's opera *Euridice* (1600), in which the instrumental part was sustained by a harpsichord, a large guitar, a viol, a large lute, and flutes. In Monteverde's opera of *Orfeo*, performed in 1604, 35 instruments were employed, including 17 of the violin species, and 12 wind instruments, chiefly to accompany the voice, although only a few of them were played at the same time. Subsequently the stringed instruments were increased, to the almost total exclusion of other kinds, and the works of Cavalli, Carissimi, and Lully are written principally for violins, violas of different degrees of power, bass viols, and double bass viols. Bach composed a number of symphonies for orchestra. They were written for two horns, two flutes, two hautboys, violins, viola, violoncello, piano (*Flügel*), and double bass. Lully sometimes employed flutes, bassoons, and trombones; but it was not until after the time of Haydn's later works that the wind instruments, whether of brass or wood, began to be recognized as an indispensable part of the orchestra. The smallest number of performers in a grand orchestra is estimated at 60, and the hall wherein they play should be of moderate size; but for the greatest effects 100 and upward must be employed. The instruments of which the modern orchestra is composed are of three classes, stringed, wind, and pulsatile, as follows:

STRINGED.	WIND.	PULSATILE.
First violins. Second violins. Violas. Violoncellos. Double basses.	Flutes. Hautboys. Clarinets. Bassoons. Horns. Trumpets. Trombones.	Kettle drums. Cymbals. Triangle.

To these instruments modern composers occasionally add others for special effects, such as the harp, pianoforte, corno Inglese, organ, tuba, bells, and bass and snare drums.

ORCHIDS, a large family of plants (*orchidaceæ*), the typical genus of which is *orchis* (the ancient name of the plant). Popularly any plant of the family, of whatever genus, is called an orchis. The orchids are monocotyledonous (endogenous), herbaceous plants, differing con-

siderably in their manner of growth; some have their rootstocks thickened to form underground tubers, while others have the bases of their connate leaves, together with the thickened base of the stem, much swollen to form a large above-ground tuber-like body, called a pseudo-bulb. The leaves present a great variety; some are thin and of short duration, others thick, fleshy, and persistent; and while some genera present a broad expanse of foliage, in others the leaves are linear, or long and cylindrical, like a piece of whip cord. The flowers are terminal and solitary, or disposed in a raceme or panicle; and the struc-



FIG. 1.—Structure of Flower in Orchids (*Habenaria orbiculata*).

ture in these is so strikingly unlike that in other flowers that a plant of this family is readily recognized. The flowers are six-parted; the three outer parts, corresponding to the calyx, are usually petal-like, and these with the three inner parts, or corolla, are often so unlike in size and shape that the flowers are usually conspicuously irregular; this irregularity is mostly due to one of the three petals, which in the flower appears lowermost; this is called the lip or *labellum*, and is usually quite dissimilar to the other two petals. In the greater green orchis (*Habenaria orbiculata*), fig. 1, selected for illustration on account of its simpler structure, the three sepals (1), the upper larger than the other two, are much broader than the petals, two of which are seen (2) pointing upward, while the third, the lip (3), extends downward like a long flat ribbon; in other species the lip spreads out like a broad fan, which is sometimes lobed and beautifully

fringed; in others it has its edges turned in to form a sort of tube, or it may be, as in the cypripediums (see LADY'S SLIPPER), distended to form a large inflated sac. It is upon the lip that the most beautiful colors and the strongest markings are displayed, and not only on this account but by its greater size the lip is the most noticeable part of the flower. The base of the lip is frequently hollowed out to form a sac, or is prolonged to form a spur which secretes honey; this in the greater green orchis is very long and conspicuous, it being the club-shaped body (4), nearly twice as long as the lip. In the centre of the flower are the reproductive organs, which in this family consist of one, or at most two stamens, united with the pistil, or rather the style; the two being blended into a column, makes the structure at first sight puzzling. In fig. 1 the column (5) is seen in the centre of the flower, and at 6 it is shown more enlarged; it consists of a large anther united with a concave stigma seen between its widely separated cells. In the majority of the orchids the pollen is agglomerated in two or more pollen masses (*pollinia*), in which the grains are held together by minute elastic threads, or are in a compact waxy mass; these pollen masses (7), which are lodged in the cells or pockets of the anther, have often a little pedicel or stalk, at the base of which is a viscid disk or gland (8); this, coming in contact with an insect visiting the flower, adheres to it, and the pollen mass is thus withdrawn from its pouch and carried by the insect to another flower; indeed, the structure is such throughout the whole family, varied admirably in different genera, that the flowers cannot be fertilized except through the aid of insects. As early as 1793 Sprengel showed that the pollen masses in some orchids could only be removed from their lodgment in the pouches by the aid of insects; and Robert Brown in 1833 announced the opinion that insects were essential to the fructification of most orchids. It remained for Darwin ("Fertilization of Orchids," London, 1862) to present the subject in all its details, to show the

wonderfully varied mechanism of the different genera, and to point out the beneficial results from the intercrossing attending this method of fertilization. The relations of our native orchids to insects have been studied by Gray and others, and similar observations have been made upon other

plants. (See INSECT FERTILIZATION.) In flowers having a structure similar to that of the greater green orchis the act of fertilization is very simple, and may be imitated by the use of a lead pencil or similar pointed implement. The disk at the lower end of the pollen masses is so exceedingly viscid that when the pencil is thrust into the throat of the flower and withdrawn, like an insect's proboscis, one or both of the pollen masses are brought out with it; the viscid matter quickly hardening and fixing them firmly, as at *a*, fig. 2. If the pencil were now thrust into the throat of another flower, the pollen mass would not come in contact with the stigma, a difficulty which is overcome in a most wonderful manner. The stem of the pollen mass is endowed with a remarkable power of contraction, and in about 30 seconds after its dislodgment from the anther cell the pollen mass assumes the position shown at *b*, always bending toward the point of the pencil or the proboscis of the insect; so by the time an insect, with the pollen mass glued to his head or proboscis, can fly to another plant, the mass is in just the position to reach the stigma while the insect is searching for honey. In the greater green orchis, the tube containing the honey is so very long that but few insects have a proboscis sufficient to reach it, and it is thought by Gray that the work of fertilization is done by some of the sphinxes, which have been caught with pollen masses attached to their eyes, as in figs. 3 and 4, from Gray. Fig. 3 gives a side view of the head of the moth as it leaves a flower with the pollinia freshly attached to its eyes, and fig. 4 is a front view of the same head by the time it has reached another plant, the masses having assumed by curving a position which will bring them in contact with the stigma of the next flower the insect explores. The form and position of the

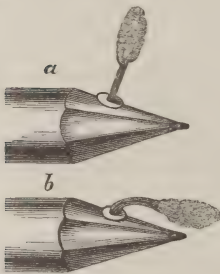


FIG. 2.—Pollen Mass: *a*, just detached; *b*, after a few seconds.

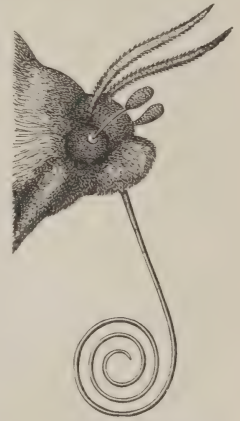


FIG. 3.—Head of Sphinx with recently attached Pollen Masses.



FIG. 4.—Head of Sphinx with Pollen Masses deflexed.

pollen masses in other genera, and the mechanism of the operation, differ widely from the simple illustrations here given; for these the reader is referred to Darwin's work. This

subject has its economical application; the attempts to produce vanilla in the East Indies have failed, the plants, while they grow and flower abundantly, bearing no fruit. It is believed that the insect which fertilizes the flower in Central America is needed to complete the act. The ovary in orchids is inferior (9, fig. 1), and is twisted half a turn in such a manner as to reverse the position of the parts of the flower; thus the lip, which is structurally the superior petal, is by this torsion of the ovary made to appear as the inferior or lower. In ripening, the ovary forms a one-celled, leathery or membranous, cylindrical or ovoid capsule, with innumerable seeds of an appearance which has been likened to fine sawdust. —Orchids are found in nearly all countries except those upon the borders of the frozen zone, and those of excessive dryness. In northern localities the species are terrestrial, usually inhabiting marshy places or shady woods; in tropical countries many of them are epiphytal, growing upon the branches of trees in dense and humid forests without contact with the earth. In this country there are east of the Mississippi about 70 species of *orchidaceæ* distributed in 18 genera, and all of these are terrestrial, except two epiphytal species of *epidendrum* found in Florida. *Calypso borealis* extends in British America as far north as lat. 68°; this is also found in northern Europe, and is the most boreal species known. Our most conspicuous orchids are the cypripediums, already referred to; but some of the smaller flowered ones, such as *Arethusa* and *Calypso*, are plants of great beauty, while some species of *pogonia* are exceedingly grotesque. Our largest genus is *habenaria* (Lat. *habena*, a thong or rein, in reference to the shape of the lip in some species); this includes about 20 species, some of which, like *H. integra*, are not at all showy. *H. orbiculata*, the flower of which has been already mentioned, is noticeable for its two large, orbicular leaves, sometimes 8 in. across, which lie flat upon the ground; this is frequently met with in pine and hemlock woods. The white-fringed orchis (*H. blephariglottis*) and the yellow-fringed (*H. ciliaris*) are objects of real beauty; and there are three fine lilac or purple-flowered ones to be found in our moist meadows and bogs. Of the genus *orchis* we have but a single representative, the showy orchis (*O. spectabilis*), which is found from Kentucky northward, in rich, moist woods; it has two oblong shining leaves, 3 to 5 in. long, from between which rises the flower stalk, about 6 in. high, bearing a few handsome white and pinkish flowers. England has 10 species of *orchis*. —Though so large a family, the *orchidaceæ* yield but few useful products, the most important commercially being the pods of several species of *vanilla*. (See VANILLA.) The tubers of some species contain a form of nutritive starch, associated with a peculiar gum; these are collected and dried, and are

found in commerce as salep. Orchids are among the most valued of cultivated flowers, some for their beauty, others for their fragrance, and others for their grotesque forms.



FIG. 5.—Butterfly Orchis (*Oncidium papilio*).

Their simulative forms are sometimes wonderful; the flowers of one species are quite like the mouth of a cuttle fish, in others the resemblance to a large spider is equally strong, and in several species the flowers almost exactly imitate various insects; this is notably the case in the butterfly orchis, *oncidium papilio*, the flowers of which, in size, form, and color, are like a gaudy butterfly. In *peristeria* the column takes on the form of a dove. (See HOLY SPIRIT PLANT.) Among wealthy horticulturists the cultivation of orchids is often a passion, and fine specimens of rare species are purchased at almost incredible prices; the



FIG. 6.—Orchis in cultivation (*Phalenopsis amabilis*).

growing of large specimens is slow work. At the sale of the celebrated collection of Mr. Mendel in England in the spring of 1873, single specimens brought as high as £20, £40, and

one plant £59 17s., the returns for the whole collection being £4,361. At the few sales which have been held in this country, very good prices have been paid. Some orchids are remarkable for the duration of their flowers, which renders them especially valuable in floral decorations. The finest collection of these plants in this country (and one of the finest anywhere) is that of Mr. George Such, South Amboy, N. J.

ORCHOMENUS, a city of ancient Greece, in N. W. Bœotia, at the mouth of the Cephissus in Lake Copais, not far from the site of the modern village of Skripu. It was said to have been the capital of the kingdom of the Minyæ, being named from Orchomenus, the son of Minyas. Homer mentions it as sending 30 ships to the Trojan war. When the Minyæ were overthrown, Orchomenus joined the Bœotian confederacy. Its government was aristocratical, and after the Peloponnesian war it assisted Lysander the Spartan in his invasion of Bœotia (395 B. C.), and in the following year joined Agesilaus against Thebes and Athens, and took part in the battle of Coronea. By the peace of Antalcidas (387) the Thebans acknowledged the independence of Orchomenus. They gained control of it after the battle of Leuctra (371), and were persuaded by Epaminondas to admit it as a member of the Bœotian confederation; but in 367 they accused it of conspiring against the democratical constitution, and burnt the city, putting the men to the sword and selling the women and children into slavery. It was rebuilt during the Phocian war, and made a Phocian stronghold; but at the end of the sacred war (346) it again fell into the hands of the Thebans, and was destroyed as before. After the overthrow of the Thebans and Athenians at Charonea (338) it was once more rebuilt, under the protection of Macedon; but it never regained any historic importance. Orchomenus was famous for its musicians, and for a festival in honor of the Graces in which poets and musicians from all parts of Greece took part. Remains have been discovered of the treasury of Atreus, and the pedestal of a tripod dedicated to the Graces, besides some ancient inscriptions in the Orchomenian-Æolic dialect, containing the digamma, which are now in the British museum.

ORDEAL (Ang. Sax. *ordæl*, from *or*, primitive, and *dæl*, judgment; Ger. *Urtheil*), an ancient form of trial for persons accused of crime, designed to determine their guilt or innocence by a supposed reference to the judgment of God. The earliest mention of such a practice is in the laws of Moses (Numbers v.), according to which the Hebrew woman suspected of adultery is to drink the "waters of jealousy." Trial by ordeal seems to have been known in Greece, as in the "Antigone" of Sophocles a sentinel who had failed in fulfilling a trust is represented as declaring that he is ready to "handle hot iron and walk over fire" to prove

his innocence. In modern Europe trials by fire and by water were most usual. "Fire ordeal," says Blackstone, "was performed either by taking up in the hand, unhurt, a piece of red-hot iron of one, two, or three pounds weight; or else by walking barefoot and blindfold over nine red-hot ploughshares, laid lengthwise at unequal distances; and if the party escaped being hurt, he was adjudged innocent; but if it happened otherwise, as without collusion it generally did, he was then condemned as guilty." The trial by fire was the one commonly in use among the higher orders, and several instances are recorded in which noble females by means of it vindicated their chastity.—The trial by water, the origin of which is usually ascribed to Pope Eugenius II., was of two kinds, that by boiling water and that by cold water. In the former, the individual thrust into a vessel of hot water his arm, which when withdrawn was bound up and sealed, and at the end of three days examined. If no trace of scald appeared he was declared innocent. In the cold water ordeal the individual was thrown into the water, and if he floated without swimming he was considered guilty; but if he sank he was deemed innocent and drawn out. A trace of this practice lasted until a late period in the case of persons suspected of witchcraft, in which the victim, with the right arm bound to the left leg and the left arm to the right leg, was cast into a pond, and if the body floated the charge was thought to be proved. In Malabar the suspected criminal was obliged to swim across a large stream abounding in crocodiles. As, according to Blackstone, the ordeal could be performed by deputy, the principal answering for the result, and the deputy only venturing on some corporeal pain for hire or for friendship, language has preserved a relic of the practice in the expression "to go through fire and water to serve one."—The corsned, or trial by the hallowed bread and cheese, was chiefly practised by ecclesiastics. A morsel of bread or of cheese, loaded with imprecations, was given the accused to eat along with the eucharist; and if the person were guilty, it was believed he could not swallow it. The ordeal of the bier, which was common in cases of murder, existed from a very early period and as late as the 18th century. The murdered man was laid upon a bier, and the suspected criminal was obliged to touch his body, and particularly the wound. If blood flowed, if foam appeared at the mouth, or if the body moved, the charge was deemed to be proved. The ordeal of battle (see *APPEAL*, vol. i., p. 596) seems to have been unknown among the ancients, except by a Spanish tribe mentioned in Livy (xxviii. cap. 21). William the Conqueror introduced it into England. Decretals were issued against this method of deciding disputes by Pope Alexander III. in 1179 and by Innocent III. in 1215, and Louis IX. abolished it in the ordinance of 1260. From this time

the practice fell gradually into disuse. Other forms of ordeal, chiefly local, such as the weighing of witches, were practised in northern Germany as late as the beginning of the 18th century. If they were exceedingly light, they were declared guilty.—The practice of these ordeals sprang from a superstitious belief that a just God would interfere to punish the guilty. Yet, although ordeals were performed upon consecrated ground, and though so late as the reign of King John the clergy of England had the privilege of using the *judicium ferri, aquæ et ignis*, the church early and earnestly endeavored to do away with them. The temporal power came to the aid of the spiritual, and by the 16th century the practice with a few exceptions had been given up. According to Sir Edward Coke, it was abolished in England in the reign of Henry III.—In Hindostan especially the system of ordeals was developed, so that, according to Warren Hastings in the first volume of the “Asiatic Researches,” there were nine kinds of ordeal in use, all equally absurd. The laws of Manu contain the following directions: “According to the nature of the case, let the judge cause him who is under trial to take fire in his hand, or to plunge in water, or to touch separately the heads of his children and of his wife. Whom the flame burns not, whom the water rejects not from its depths, whom misfortune overtakes not speedily, his oath shall be received as undoubted.” Ordeals of various kinds, but chiefly the trials by fire and by water, are found among the Japanese, the Chinese, the natives of Pegu and of Guinea, and the tribes of Asiatic Russia. In Japan, while the ordeal of fire was employed, accused persons were also sometimes required to swallow a paper inscribed with mysterious characters, which was supposed to give them no rest if guilty till they confessed. In Siam the accuser and the accused were placed together, and a tiger was let loose upon them. If one was spared, he was considered innocent; if both were destroyed, they were both deemed guilty. In Madagascar the trial by ordeal was long practised, the supposed criminal being made to drink a decoction of a poisonous fruit called the *tangena*, a small dose of which acts as an emetic, while a large dose is fatal. By managing the size of the dose, those who administered it could decide the result. In 1862 the practice was totally abolished by royal edict.—See “Superstition and Force,” by Henry C. Lea (Philadelphia, 1870).

ORDERICUS VITALIS, an English chronicler, born at Attingesham (now Aitcham), near Shrewsbury, Feb. 17, 1075, died about 1143. He passed most of his life in the monastery of St. Evroult in Normandy. He wrote an “Ecclesiastical History of England and Normandy” down to the year 1141, which was first printed in Duchesne’s *Historia Normannorum Scriptores* (1619). There is an English translation by T. Forester in Bohn’s “Antiquarian Library” (4 vols., 1853–’6).

ORDERS, or *Holy Orders*. See **ORDINATION**.

ORDERS, *Religious*. See **RELIGIOUS ORDERS**, and **MONACHISM**.

ORDERS IN COUNCIL, a term applied to orders made by the sovereign of Great Britain by advice of the privy council. Strictly these can only be made in the exercise of executive authority, and an order in its nature legislative would be unconstitutional as encroaching upon the authority of parliament. The famous orders in council of 1807–’8, made in retaliation for the Berlin and Milan decrees of Napoleon, were condemned as legislative, but were defended by the supporters of the government as being issued in pursuance of the sovereign’s authority to declare and prosecute war. In emergencies, when parliament is not in session, the executive sometimes assumes to take legislative action on some subjects, relying upon being indemnified by act of parliament afterward, as for instance when circumstances are thought to render imperative a suspension of the writ of *habeas corpus*, or of specie payments by the bank of England.

ORDINARY (Roman law, *judex ordinarius*), in its proper sense, or that which it bore in the Roman law, a judge who took cognizance of causes in the regular course and proper right of his office, and not by way of special deputation. This acceptance of the word is very exactly preserved in the ecclesiastical law, though in books of the common law the bishop who is the ordinary in England is familiarly referred to as “one who has ordinary jurisdiction in causes ecclesiastical.” The bishop of each diocese is the ordinary therein. In virtue of his office he certifies excommunications, the lawfulness of marriages, and the like ecclesiastical and spiritual matters, to the courts of common law. Formerly, and until the statute 8 Elizabeth, c. 4, under claim of the benefit of clergy, he asserted an exclusive jurisdiction over his clerks. But the particular and most prominent judicial function of the ordinary consisted in his grant of probate of wills and letters testamentary. Of these matters the bishops, or in certain cases the archbishops, had for many centuries, and until very recently, exclusive jurisdiction. It has been much discussed whether the probate of wills and the granting of administrations were matters entirely and originally of ecclesiastical cognizance. It is now the better opinion that they were not, but that they belonged to the county courts, or to the courts baron of the lords of manors. Certainly these courts existed and wills were made before an ecclesiastical jurisdiction was established. After that was done, and until the time of the conquest, the bishop sat with the earl in the county court. The spiritual and temporal courts were separated in the time of William I., but it is not clear to which of the two the cognizance of wills was intrusted. But Spelman asserts, mainly on the authority of Glanvil, that in the times of Henry I. and Henry II. testamentary causes were regularly heard

in the ecclesiastical courts. Since that time the probate jurisdiction of all the dioceses has been in the bishops' or archbishops' courts; and from it the forms and method of probate jurisdiction were borrowed in the United States, with more or less change. But by the "probate act" of 20 and 21 Victoria (1857), and by an additional act of 1858, the whole of the probate jurisdiction of England was taken from the ordinary, and vested in a court of probate.—In the United States the officer to whom probate of wills is committed is called in some judge of probate, in others ordinary register, or surrogate. (See PROBATE.)

ORDINATION, the act of conferring holy orders, or of initiating a person into the ministry of religion, or setting him apart for performing ecclesiastical rites and duties. All the Christian denominations which have a special ministry use some kind of ordination, but their opinions greatly differ respecting the authority by which it is conferred, its essence, and its effect. The Roman Catholic, the eastern (Greek, Armenian, Nestorian, and Jacobite), and the Protestant Episcopal churches agree in maintaining that ordination is a prerogative of the bishops. The Roman Catholic and the eastern churches, and the "High Church" party of the Protestant Episcopal church, deny the validity of the orders, and even the legitimate existence, of a church where there is no bishop. The Presbyterian churches hold that the presbytery have authority for this purpose, and that bishops and presbyters are in Scripture identical. The ordination of Wesleyan Methodist ministers takes place in the annual conference, with a president at its head and without the imposition of hands. Among the Calvinistic Methodists, ordination is performed by the sanction and assistance of their own ministers. Among the Independents and Baptists, the power of selecting for ordination lies in the congregation, which tries the qualifications of the candidate, and gives him a call to be its minister. Ministerial brethren of standing assemble by request of the congregation, to examine his credentials and to inquire as to his religious and moral character and his theological views; and should all these prove satisfactory, they ordain him by prayer and laying on of hands. The society of Friends reject all ceremonies of ordination. In the Anglican church and other Protestant Episcopal churches, a candidate must be 23 years of age before he can be ordained deacon, and 24 before he can be ordained priest. He is also obliged to subscribe to the thirty-nine articles. The council of Trent appointed that unbefitted candidates for the secular priesthood must possess a competency, and a similar rule still obtains in the church of England. The stated times of ordination are the four Sundays immediately following the Ember week; *i. e.*, the second Sunday in Lent, Trinity Sunday, and the Sundays following the first Wednesday after Sept. 14 and Dec. 13. The bishops have the right, if

circumstances make it desirable, to ordain candidates at any time. In the Roman Catholic church the ordination for the four lower orders may be bestowed in exceptional cases by priests, but that for the three higher orders (subdeacon, deacon, and priest) is reserved to the bishop. The Roman Catholic church makes the validity of an ordination dependent on the apostolic succession of the ordaining bishops; she rejects therefore the ordination not only of the Danish, but also of the Anglican church, on the ground that the latter has not proved the apostolic succession of her bishops. The ordination of the Greek and the other eastern churches is not regarded as invalid, but only as illicit, as is the ordination by any bishop who is not in communion with the pope.—The Roman Catholic and the eastern churches regard ordination as one of the seven sacraments, called by the Latins the sacrament of order or of ordination, and by the Greeks *χειροτονία*, extending of hands (voting by show of hands, election by vote), and *χειροθεσία*, imposition of hands. In the opinion of the Protestant churches it is only a rite for setting apart a minister for his ecclesiastical duties. In the Protestant Episcopal and the Lutheran churches, the essence of the ordination is a subject of controversy. According to the Roman Catholic doctrine, ordination confers supernatural grace and fitness for the sacred office, and impresses on the ordained minister an indelible character, separating him forever from the laity. On this point there is a difference among the Protestant churches, some regarding ordination only as an initiation into the ministerial office.

ÖREBRO, a city of Sweden, capital of a län or province of the same name, situated at the W. end of Lake Hjelm, which receives here the Swarta river and forms a harbor, 100 m. W. of Stockholm; pop. about 9,000. It is of great antiquity. The town has manufactories of cloth and hosiery, and an important printing establishment. In the vicinity are the Adolfsberg mineral springs. Here were held the memorable assemblies of the states under Gustavus Vasa in which Lutheranism was declared the religion of the kingdom (1529), and the crown was made hereditary (1540). Preliminaries of peace between Sweden and England were concluded here in April, 1812; and a treaty of peace between England and Russia was signed here July 12, 1812.

OREGON, a N. W. state of the American Union, on the Pacific coast, the 20th admitted under the constitution, situated between lat. 42° and 46° 20' N., and lon. 116° 40' and 124° 35' W.; average length E. and W. about 360 m., average breadth about 260 m.; area, 95,274 sq. m. It is bounded N. by Washington territory, from which it is partly separated by the Columbia river; E. by Idaho, from which it is partly separated by the Snake river; S. by Nevada and California; and W. by the Pacific ocean. The state is divided into 23 counties,



OREGON

Scale of Miles
0 10 20 30 40 50 60

County Towns & Railroads
This type indicates a population
of 1,000 or over.

CLATSOP
Astoria
Ft. Stevens
Tillamook
Naselle
Cannon Beach
Astoria
Ft. Stevens
Tillamook
Naselle
Cannon Beach

WASHINGTON
Tacoma
Seattle
Everett
Bellingham
Olympia
Vancouver
Burien
Tacoma
Seattle
Everett
Bellingham
Olympia
Vancouver
Burien

IDAHO
Boise
Idaho Falls
Pocatello
Twin Falls
Coeur d'Alene
Lewiston
Pocatello
Twin Falls
Coeur d'Alene
Lewiston

UTAH
Salt Lake City
Provo
Ogden
Cedar Rapids
Mojave
Panguitch
Alton
Hatch
Tropic
Alton
Hatch
Tropic

NEVADA
Las Vegas
Reno
Sparks
Carson City
Elko
Battle Mountain
Carson City
Elko
Battle Mountain

ARIZONA
Phoenix
Tucson
Flagstaff
Prescott
Yuma
Palm Springs
Phoenix
Tucson
Flagstaff
Prescott
Yuma
Palm Springs

NEW MEXICO
Albuquerque
Santa Fe
Las Alamos
Roswell
Farmington
Albuquerque
Santa Fe
Las Alamos
Roswell
Farmington

COLORADO
Denver
Boulder
Fort Collins
Greeley
Windsor
Durango
Boulder
Fort Collins
Greeley
Windsor
Durango

KENTUCKY
Lexington
Covington
Louisville
Frankfort
Paducah
Lexington
Covington
Louisville
Frankfort
Paducah

MISSISSIPPI
Jackson
Memphis
Nashville
Birmingham
Mobile
Jackson
Memphis
Nashville
Birmingham
Mobile

ALABAMA
Montgomery
Birmingham
Mobile
Tuscaloosa
Selma
Montgomery
Birmingham
Mobile
Tuscaloosa
Selma

LOUISIANA
New Orleans
Baton Rouge
Shreveport
Lafayette
Lake Charles
New Orleans
Baton Rouge
Shreveport
Lafayette
Lake Charles

MISSOURI
St. Louis
Kansas City
Springfield
Joplin
Warrensburg
St. Louis
Kansas City
Springfield
Joplin
Warrensburg

ILLINOIS
Chicago
Springfield
Peoria
Decatur
Carbondale
Chicago
Springfield
Peoria
Decatur
Carbondale

INDIANA
Indianapolis
Columbus
Fort Wayne
Ellettsburg
Bloomington
Indianapolis
Columbus
Fort Wayne
Ellettsburg
Bloomington

KANSAS
Topeka
Wichita
Lawrence
Hutchinson
Salina
Topeka
Wichita
Lawrence
Hutchinson
Salina

OKLAHOMA
Oklahoma City
Tulsa
Lawton
Muskogee
Bartlesville
Oklahoma City
Tulsa
Lawton
Muskogee
Bartlesville

TEXAS
Houston
Dallas
San Antonio
Austin
Fort Worth
Houston
Dallas
San Antonio
Austin
Fort Worth

LOUISIANA
New Orleans
Baton Rouge
Shreveport
Lafayette
Lake Charles
New Orleans
Baton Rouge
Shreveport
Lafayette
Lake Charles

MISSISSIPPI
Jackson
Memphis
Nashville
Birmingham
Mobile
Jackson
Memphis
Nashville
Birmingham
Mobile

ALABAMA
Montgomery
Birmingham
Mobile
Tuscaloosa
Selma
Montgomery
Birmingham
Mobile
Tuscaloosa
Selma

MISSOURI
St. Louis
Kansas City
Springfield
Joplin
Warrensburg
St. Louis
Kansas City
Springfield
Joplin
Warrensburg

ILLINOIS
Chicago
Springfield
Peoria
Decatur
Carbondale
Chicago
Springfield
Peoria
Decatur
Carbondale

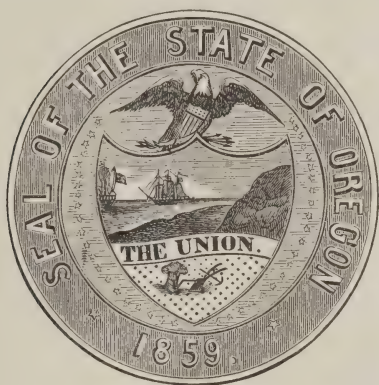
INDIANA
Indianapolis
Columbus
Fort Wayne
Ellettsburg
Bloomington
Indianapolis
Columbus
Fort Wayne
Ellettsburg
Bloomington

KANSAS
Topeka
Wichita
Lawrence
Hutchinson
Salina
Topeka
Wichita
Lawrence
Hutchinson
Salina

OKLAHOMA
Oklahoma City
Tulsa
Lawton
Muskogee
Bartlesville
Oklahoma City
Tulsa
Lawton
Muskogee
Bartlesville

TEXAS
Houston
Dallas
San Antonio
Austin
Fort Worth
Houston
Dallas
San Antonio
Austin
Fort Worth

viz.: Baker, Benton, Clackamas, Clatsop, Columbia, Coös, Curry, Douglas, Grant, Jackson, Josephine, Lake, Lane, Linn, Marion, Multnomah, Polk, Tillamook, Umatilla, Union, Wasco, Washington, and Yamhill. The chief city and commercial metropolis is Portland (pop. in 1870, 8,295), on the Willamette river, 12 m. above its junction with the Columbia. Salem (pop. 1,139), the capital, is on the E. bank of the Willamette, 50 m. S. of Portland. Other places with from 500 to 2,000 inhabitants are Astoria, near the mouth of the Columbia; Forest Grove, 20 m. W. of Portland; Albany, Corvallis, Eugene City, Harrisburg, and Oregon City, on the Willamette; Roseburg, in the valley of the Umpqua river; Jacksonville, in Rogue river valley; Dalles, on the Columbia; La Grande, on Grande Ronde river; Pendleton, on Umatilla river; and Baker City, in Baker co. The total population (federal censuses) has been as follows: 1850, 13,294; 1860, 52,465; 1870, 90,923, of whom 346 were colored, 3,330 Chinese, and 318 non-tribal Indians.



State Seal of Oregon.

According to the state census of 1865 it was 65,090. Next to Nevada it is the least populous state of the Union. Of the total population in 1870, 79,323 were native and 11,600 foreign born, 53,131 males and 37,792 females. Of the natives, 37,155 were born in the state, 7,061 in Missouri, 4,722 in Illinois, 4,031 in Ohio, 3,695 in Iowa, 3,451 in Indiana, 3,092 in New York, 2,387 in Kentucky, 1,930 in Pennsylvania, 1,710 in California, 1,544 in Tennessee, 1,447 in Virginia and West Virginia, 746 in Massachusetts, 676 in Maine, and 606 in Washington territory; and there were persons living in the state born in every other state and every territory except Dakota. Of persons born in the state, 6,225 were living in other parts of the Union. Of the foreigners, besides the Chinese, 3,771 were natives of the British isles, 1,875 of Germany, and 1,187 of British America. There were 24,608 male citizens of the United States 21 years old and upward residing in the state. The number of families was 18,504, with an

average of 4.91 persons to each; of dwellings, 19,372, with an average of 4.69 to each. There were 2,609 persons 10 years old and upward unable to read, and 4,427 unable to write, of whom 3,003 were natives and 1,424 foreigners, 808 Chinese, and 118 Indians; 122 insane persons, 55 idiotic, 23 deaf and dumb, and 35 blind; paupers supported during the year ending June 1, 1881, at a cost of \$24,800; receiving support on that date, 81; persons convicted of crimes during the year, 80. Of the 30,651 persons 10 years old and upward returned as engaged in all occupations, 13,248 were employed in agriculture, including 3,126 agricultural laborers and 9,758 farmers and planters; 6,090 in professional and personal services, including 162 clergymen, 830 domestic servants, 2,962 laborers, 194 lawyers, 206 physicians and surgeons, and 410 teachers; 2,619 in trade and transportation; and 8,694 in manufactures and mining, including 3,965 miners. A majority of the inhabitants are settled in the Willamette valley, the districts W. of the Coast mountains and E. of the Cascade range being thinly inhabited. The tribal Indians of Oregon in 1875 numbered about 8,000, of whom 2,500 or 3,000 were roving bands, chiefly along the Columbia river and in the E. and S. E. parts of the state; the rest are settled on reservations or at agencies. Some of them are partially civilized and are engaged in agriculture. There are seven reservations: the Alsea, about the centre of the Pacific coast; the Siletz, N. of this; the Grande Ronde, E. of the Siletz; the Klamath, in the Klamath basin; the Warm Springs, in the N. part of the state, just E. of the Cascade mountains; the Umatilla, in the N. E. part of the state; and the Malheur, on the N. fork of the river of that name. The Oregon Indians comprise numerous small bands, including Alseas, Bannacks, Calapooyas, Cayuses, Clackamas, Clatsops, Coosas, Klamaths, Modocs, Molels, Nez Percés, Pi-Utes, Shasta Scotans, Shoshones, Sinclaws, Snakes, Terrinoes, Tillamooks, Umatillas, Umpquas, Walla-Wallas, Warm Springs, and Wascoes.—Oregon is divided into two unequal parts, known as eastern and western Oregon, by the Cascade mountains, which cross the state from N. to S. at an average distance of 130 m. from the coast. The two sections differ in climate, soil, and topography. The Cascade mountains are from 4,000 to 10,000 ft. high, with occasional peaks rising still higher, of which the principal are Mt. Hood, in lat. 45° 20', according to Lieut. Col. Williamson (1867), 11,225 ft. high; Mt. Jefferson, in lat. 44° 40', 10,200 ft.; the Three Sisters, in lat. 44° 10', 9,420 ft.; Diamond peak, 9,420 ft.; Mt. Thielsen, 8,500 ft.; Mt. Scott, 8,500 ft.; and Mt. McLaughlin or Pitt, in lat. 42° 25', 11,000 ft. All these rise into the region of perpetual snow, and all of them are extinct volcanoes. How long they have been extinct is not known, but the Indians have traditions of a time when Mt. Hood was an active volcano. Western Oregon,

extending from the Cascade range to the Pacific ocean, embraces about a third of the state, and is divided by mountain chains into four districts differing somewhat from each other in soil, climate, and topography. The Coast mountains, running N. and S. at an average distance of 25 m. from the coast, vary from 1,000 to 4,000 ft. in height. The tract between them and the ocean is broken and hilly. Between the Coast and Cascade mountains, terminated on the south by the Calapooya range (1,000 to 2,000 ft. high), is the Willamette valley, a rolling prairie 40 by 140 m. in extent. S. of this is the Umpqua valley, consisting of alternate hills and vales, and S. of the Umpqua valley and separated from it by the Umpqua mountains (1,000 to 4,000 ft. high) is the Rogue river valley, of irregular width and diversified surface. It is bordered S. by the Siskiyou mountains (2,000 to 5,000 ft. high), which lie along the California border. Eastern Oregon, embracing all the state E. of the Cascade range, consists generally of undulating table lands, seamed by deep cañons, and marked by truncated cones of moderate altitude, which rise abruptly from the general level. It is traversed by the Blue mountains, which extend S. W. from near the N. E. corner of the state. These have an average altitude of 7,000 ft., but toward the north fall to 5,000 ft. They throw off spurs in various directions, which divide the country, particularly on the east, into a series of deep valleys. The Eagle Creek mountains are the most important of these spurs, extending 40 m. E. and W., and then N. along the Snake river, including the valleys of Burnt, Powder, and Grande Ronde rivers. They are cut in many places by cañons, with perpendicular faces from 1,000 to 2,000 ft. high. In the S. part of eastern Oregon are a number of minor mountain ranges, having an altitude of from 1,000 to 4,000 ft. The Great Basin extends into eastern Oregon from Nevada, stretching N. W. to the head waters of the Des Chutes river.—Oregon has a coast line on the Pacific of more than 300 m. Numerous capes and promontories are formed by spurs of the Coast mountains, the principal of which, commencing at the south, are Cape Orford or Blanco (the westernmost point of the state), Cape Arago, Umpqua head, Cape Perpetua, Cape Foulweather, Cape Lookout, Tillamook head, and Point Adams, at the mouth of the Columbia. The harbors are neither large nor numerous, but are generally safe. The first on the south is formed by Rogue river (lat. 42° 25'), reported to have two fathoms of water. Many rocks border the shore, and a dangerous reef, with a channel 1 m. wide, lies off the entrance. Port Orford (lat. 42° 40') is safe during the summer, that is, while the N. winds blow, but is open to the south and is insecure during the winter months. The harbor is 2 m. long and 1 m. wide, and has good anchorage in from 4 to 6 fathoms. It has been proposed to make it a harbor of refuge by the erection of a break-

water to protect it from S. winds, and the matter has been brought to the attention of congress. The Coquille river (lat. 43° 7') is accessible by vessels of light draught. Coos bay (lat. 43° 21') is about 10 m. long and 2 m. wide, and has a depth of from 3 to 4 fathoms; the bar sometimes fills up in winter, which prevents large vessels from crossing it for a week or two. Umpqua river (lat. 43° 41') is accessible by vessels drawing 3 to 15 ft. Yaquina bay (lat. 44° 40') is about 4 m. long and 2 m. wide; the bar has a depth of less than 2 fathoms at low water. Tillamook bay (lat. 45° 34') has an area of about 6 sq. m.; the entrance has a width of 600 yards, with a channel 135 yards wide and from 4 to 8 fathoms deep. Nehalem river (lat. 45° 41' 30") forms a bay 4 m. long and 8 m. wide, with an entrance from 200 to 400 yards wide, and a depth of 18 ft. at high tide. False Tillamook bay (lat. 45° 45') is nearly round, $\frac{3}{4}$ m. in diameter, with an entrance $\frac{1}{2}$ m. wide, opening to the south, and is secure except against S. winds. The Columbia river furnishes the best harbors in the state. Between Cape Disappointment (now officially called Cape Hancock) and Point Adams it is 5 m. wide. It has two channels: the south channel, more than 2 m. wide, with a depth of 4 fathoms at the lowest stage; and the north channel, more than 600 yards wide at the narrowest point, with a depth of 3 $\frac{1}{2}$ fathoms. Its chief drawbacks are a shifting bar and the prevalence of fogs at certain seasons. On Cape Disappointment at the N. entrance is a lighthouse, while Point Adams at the south is the site of Fort Stevens. There are several other lighthouses on the coast.—The Columbia forms the N. boundary of the state for about 300 m., and is navigable by steamers the entire distance, with portages of 6 and 15 m. at the Cascades and the Dalles respectively, around which railroads have been constructed. Ships ascend 115 m. above its mouth. Its chief tributary W. of the Cascade mountains is the Willamette, formed by the junction near Eugene City of three streams, known as Coast, Middle, and McKenzie forks, which rise in the Cascade range S. of Diamond peak. The Willamette flows N. 155 m., and joins the Columbia 110 m. above its mouth. It is navigable by light steamers in summer 126 m. above Portland, and by sea-going ships 18 m. Navigation was formerly obstructed by the falls at Oregon City, but the difficulty is now overcome by locks constructed at a cost of \$450,000. The chief tributaries of the Willamette are the Tualatin and Yamhill from the west, and the Clackamas, Santiam, and Calapooya from the east. East of the Cascade mountains the Columbia receives the Des Chutes river, which rises in the Cascades near the source of the Willamette, and after a N. course of about 250 m. joins the main stream a few miles above the Dalles. Crooked river rises in the Blue mountains, and after a N. W. course of 75 m. joins the Des Chutes near the centre of the

state. John Day's river rises in the Blue mountains, and has a N. course of 250 m., emptying into the Columbia a short distance above the mouth of the Des Chutes. The Umatilla and Walla Walla rivers rise in the Blue mountains, and empty into the Columbia (the latter in Washington territory) after a N. W. course of 75 m. The Snake river forms the E. boundary of the state for more than 150 m., and is navigable above the mouth of the Powder river. Its chief tributaries from Oregon are the Grande Ronde, Powder, Burnt, Malheur, and Owyhee rivers. The Grande Ronde rises in the Blue mountains, and drains the N. E. corner of the state, joining the Snake in Washington territory after a N. E. course of about 100 m. The Powder (200 m. long), Burnt (100 m.), and Malheur (140 m.) also rise in the Blue mountains, and have a general E. course. The Owyhee enters the S. E. corner of the state from Idaho, flows N. W. and N. E. in a curve, and joins the Snake, after a total course of 200 m., at the point where that river first strikes the boundary. The principal streams that flow into the Pacific from this state are the Rogue and Umpqua rivers, each about 200 m. long, which rise in the Cascade mountains and flow W., breaking through the Coast range. The Umpqua is navigable by steamers of light draught to Roseburg, about 90 m. above its mouth, though more than half this distance is obstructed by rapids. Numerous streams rise in the Coast mountains and flow W. to the Pacific, the largest of which do not exceed 50 or 60 m. in length. Among these are the Nehalem, Tillamook, Coös, and Coquille. The Nehalem alone is navigable, and but for a few miles. The head waters of Klamath river, which empties into the Pacific in California, are in the S. W. corner of eastern Oregon, just E. of the Cascade range. The Klamath marsh, 5 by 20 m. in extent, is often submerged in winter, and discharges through Williamson river into Upper Klamath lake (6 by 20 m.), which empties through Link river into Lower Klamath lake on the California border. The latter lake is the immediate source of the Klamath river. Lost river rises in California, flows N. into Oregon, and then curving W. and S. empties into Rhett or Tule lake on the California border, a few miles E. of Lower Klamath lake. E. of Tule lake is Goose lake, lying chiefly in California. Its waters find their way through Pitt river into the Sacramento. Other important lakes are Silver, Summer, and Abert, N. and N. E. of those named, and Harney and Malheur, near the head waters of the Malheur river.—The principal geological formations in Oregon are the eozoic, the volcanic, the tertiary, and the cretaceous. The eozoic occupies the Coast range and the Blue mountains, while the Cascade range and the E. and E. central portions of the state are volcanic. The tertiary forms a narrow strip along the Pacific, and occupies the Willamette valley, the upper portion of the Umpqua val-

ley, the valley of the Grande Ronde, and a considerable tract E. of the Cascade mountains and S. of the 44th parallel. The cretaceous chiefly occurs along the upper Des Chutes and John Day's rivers and their tributaries.—Oregon is rich in minerals. Gold is found at various points in the southwest along the streams and in the sands of the seashore. It was first discovered in 1852 in Jackson co., and mining is still carried on in Jackson, Josephine, and Douglas cos.; but the chief mining region is E. of the Cascade mountains (where the metal was discovered in 1861), on the head waters of John Day's river and on Burnt and Powder rivers. The most productive mines are in Baker and Grant cos. The mines are chiefly placer, but attention has recently been directed also to the quartz lodes. Silver occurs in all the quartz ledges of the state, and is found mingled with galena and other minerals, but mining operations have not been carried on. In Baker co. a deposit has been found yielding from \$150 to \$300 per ton of ore. Copper has been found not only in the form of oxides and carbonates, but also in solid ledges. It occurs in all the counties E. of the Blue mountains, in those W. of the Coast range, and in Douglas, Jackson, and Josephine cos. The only mine in operation is in Union co. in the N. E. part of the state. Iron ore underlies a great portion of the surface, and in some parts forms low hills. It has been found in the Willamette valley, along the coast, and in the S. and E. parts of the state. Coal of a lignitic character, and apparently of a miocene formation, is widely diffused. It is found along the Coast range and the region W. of this, in the Umpqua and Willamette valleys, E. of the Blue mountains, and elsewhere. The principal mine is on Coös bay, whence large quantities are shipped. Limestone is most abundant in the south and in the coast region. Marble of good quality occurs in Jackson and Josephine cos. Granite, sandstone, slate, syenite, &c., suitable for building, are comparatively abundant in western Oregon. In this region also occur salt springs, which yield large quantities of good salt. Steatite or soapstone is found in the Klamath basin and elsewhere. Clays for brick making and pottery occur, and the sand dunes of the coast furnish an excellent material for the manufacture of glass. The number of gold mines returned by the United States census of 1870 was 168 (139 placer, 26 hydraulic, and 3 quartz), employing 880 hands and a capital of \$321,520; wages paid during the year, \$79,022; value of materials used, \$29,930; of product, \$417,797; but these returns are admitted to be imperfect. The number of quartz mills in 1870 (including those not in operation), according to the report of the United States commissioner of mining statistics, was 15 (1 for the production of silver and 14 of gold), with 62 stamps and 19 arrastras. The bullion product of the state to the close of 1867, according to J. Ross Browne,

was \$22,000,000, which United States Commissioner Raymond thinks more than 50 per cent. too high. The subsequent yield, according to Raymond, has been as follows: 1868, \$3,500,000; 1869, \$2,625,000; 1870, \$2,625,000; 1871, \$2,200,000; 1872, \$1,775,000; 1873, \$1,375,000; 1874, \$650,000; total, \$14,750,000. The entire product to the close of 1874 may therefore be stated at from \$26,000,000 to \$37,000,000. The amount of gold deposited at the United States mints and assay offices from Oregon to June 30, 1874, was \$12,814,071 10. Mineral springs, both hot and cold, occur in the Rogue river valley, in the Siskiyou mountains, and in eastern Oregon.—Western Oregon has a moist and equable climate; eastern Oregon, one dry and variable. In the former division there are but two seasons, the wet and the dry. The wet season commences about the latter part of November and lasts till March or April, during which drizzling rains and thick mists prevail, though there are many clear days. In the dry season the sky is generally clear, and though rain is not entirely wanting, very little falls from June to October. The climate of this division varies somewhat in different localities. In the southern portions the dry season is longer and the wet season shorter than in the northern, while in the district W. of the Coast range the atmosphere is more humid than between the Coast and Cascade mountains. Snow falls occasionally, but seldom to any considerable depth, and generally soon disappears. Ice rarely forms more than an inch or two in thickness, and soon thaws. In some winters flowers bloom in the gardens even in the N. portion of the Willamette valley. The nights in summer are always cool, and the heat during the day, seldom extreme, is never oppressive. The Cascade mountains shut out from eastern Oregon the moisture of the Pacific. The temperature here is subject to greater extremes than in the west, but the winters are shorter and milder, and the summers cooler and more equable than on the Atlantic coast. The winter commences late in December, and generally lasts three months. Snow frequently falls to the depth of 12 inches in the valleys, but 6 inches is the usual depth. In the high mountainous region of Grant co. a much greater quantity falls. Ice is formed every winter, but commonly it does not exceed a few inches in thickness. A warm S. E. wind is not uncommon, before which the snow speedily disappears. In summer the heat occasionally reaches 100°, but owing to the dryness and rarity of the atmosphere it is not severely felt. Considerable rain falls in spring, but in summer there is little rain and not much dew, though crops do not suffer from drought. In the Klamath valley, owing to its elevation (4,200 ft.), frosts occur every night of the year, and snow lies from three to five months. Thunder, lightning, hail, and heavy winds are rare in Oregon. In most parts of the state cattle are wintered without shelter or prepared food,

but loss is suffered in seasons of unusual severity. In western Oregon the most careful farmers erect sheds to protect their stock from cold rains, and furnish fodder for five or six weeks. The mean temperature of the seasons and year at Port Orford (lat. 42° 40') and Astoria (lat. 46° 10') on the coast, at Corvallis (lat. 44° 30') in the Willamette valley, and at Dalles (lat. 45° 36') just E. of the Cascade range, is stated by Murphy as follows:

LOCALITY.	Spring.	Summer.	Autumn.	Winter.	Year.
Port Orford.....	52° 00"	60° 00"	55° 00"	47° 50"	53° 5°
Astoria.....	51° 00"	61° 50"	54° 00"	42° 50"	52° 0
Corvallis.....	52° 19"	67° 13"	53° 41"	39° 27"	53° 0
Dalles.....	53° 00"	70° 50"	52° 00"	35° 50"	53° 0

At Eola (lat. 44° 57'), near Salem, the average mean temperature of the years 1870, '71, and '72 was 49° 66', varying from 49° 25' to 50° 4'; average annual rainfall, 38° 62 inches, varying from 37° 11 to 40° 84 inches; average mean temperature of spring, 47°; summer, 66° 1°; autumn, 49° 1°; winter, 37° 3°; maximum temperature, 83°; minimum, 13°. The annual rainfall at Astoria is stated at 60 inches, and in eastern Oregon at from 15 to 20 inches. The climate is generally healthy, and there is no prevailing type of disease. A species of intermittent fever occurs in the low bottoms along some of the watercourses in western Oregon, but it is mild and readily yields to treatment. The climate is believed to be beneficial to consumptives, particularly in eastern Oregon. The number of deaths according to the census of 1870 was 622, viz.: from general diseases, 304, including 85 from fevers, 34 from diphtheria, and 112 from consumption; diseases of the nervous system, 54; circulatory system, 19; respiratory system, 61, including 23 from croup and 30 from pneumonia; digestive system, 63; accidents and injuries, 55; the rest from various causes.—The soil in the valleys of the Willamette, Umpqua, and Rogue rivers is very fertile. The district W. of the Coast mountains is generally rugged, but along the watercourses and at the mouths of the streams are tracts adapted to agriculture, which possess a good soil. These valleys are more extensive toward the south. In eastern Oregon the chief agricultural tracts are along the streams. The most extensive and productive valleys are those of the Grande Ronde, Powder, and Malheur rivers. On John Day's and Crooked rivers there are also productive lands. Much of the district belonging to the Great Basin is a desert, covered in the east with sand and sage, and in the west with volcanic ashes and pumice. Lava terraces often rise one above the other to the height of 1,000 ft., and chasms appear on every hand. The only tree is a dwarf pine. Western Oregon, with the exception of the extensive prairie tracts in the Willamette valley and smaller ones in some of the other valleys, is densely wooded with gigantic forests. This is particularly true of the Coast range and the

region W. of it. On the Cascade mountains the forests extend to the snow line. While several varieties of deciduous trees occur, the forests consist chiefly of coniferous evergreens. These furnish excellent ship timber, and several species attain a height of 300 ft., and a diameter of from 8 to 20 ft. The principal varieties are the Douglas spruce or red fir (*abies Douglasii*), Williamson's spruce (*A. Williamsonii*), the yellow or western balsam fir (*A. grandis*), the silver fir (*A. amabilis*), the noble fir (*A. nobilis*), the twisted or scrub pine (*pinus contorta*), the yellow pine (*P. ponderosa*), the sugar pine (*P. Lambertiana*), the red cedar (*thuja gigantea*), the white cedar (*libocedrus decurrens*), the Oregon yew (*taxus brevifolia*), the western juniper (*juniperus occidentalis*), and the Port Orford cypress (*cupressus Lawsoniana*). The largest tree in Oregon is the redwood (*sequoia sempervirens*), which grows along the shores of the Pacific, and is surpassed in size only by the *sequoia gigantea* of California. Among deciduous trees the most important are the Oregon oak (*quercus Garreyana*), the only oak in the state, confined to the region between the Coast and Cascade mountains; the white maple (*acer macrophyllum*), the Oregon ash (*fraxinus Oregona*), the Oregon alder (*alnus Oregona*), the western chinquapin (*castanea chrysophylla*), and Nuttall's cornel (*cornus Nuttalli*). In eastern Oregon timber is scarce, except along the streams and on the mountains. The Blue mountains are well wooded. The principal varieties here are poplar, cottonwood, aspen, birch, willow, &c., on the watercourses, and the larch, pine, fir, cedar, maple, &c., on the mountains. Some species are found in both divisions of the state. Among wild fruits are grapes, cherries, plums, and numerous species of berries, including gooseberries, currants, cranberries, strawberries, and blackberries. In western Oregon, particularly W. of the Coast range, grass is abundant, owing to the prevalence of moisture, while in the E. section the nutritious bunch grass (*festuca scabrella*) abounds. The greater part of the state is well adapted to stock and sheep raising. The table lands of eastern Oregon may be profitably devoted to this industry. Wheat is the chief crop; its yield is large and its quality excellent. By far the greater portion is raised in the Willamette valley. The climate and soil are also well adapted to oats and barley. Rye and buckwheat have been little cultivated. Indian corn is not extensively raised, the climate being better suited to the production of the smaller grains. It grows best in portions of eastern Oregon and in the S. valleys between the Coast and Cascade mountains. Potatoes, peas and beans, cabbages, onions, turnips, carrots, and other root crops grow well. Flax grows wild in the vicinity of the Klamath basin. Apples, pears, plums, cherries, and grapes thrive, and considerable quantities of apples are raised in the Willamette valley. Prunes are grown in many portions of

western Oregon, and peaches succeed well in the E. and S. sections of the state. Figs have been successfully grown in the S. part of western Oregon.—The principal indigenous quadrupeds of Oregon are the grisly bear, black bear, American panther (*felis concolor*), the wild cat, the gray wolf, the coyote (*canis latrans*), the mountain sheep, the elk, the black-tailed deer, and the antelope. The most prominent birds are the California vulture (*cathartes Californianus*), turkey buzzard, golden eagle, bald eagle, fish hawk, trumpeter swan (*cygnus buccinator*), American swan, Canada goose, snow goose, brant, four species of albatross, three of pelicans, and seven of gulls. Of reptiles there are none deserving special mention, save the rattlesnake, which is not abundant. The rivers of Oregon abound in salmon at the proper seasons; there are several species. Other varieties of fish are the cod, halibut, sturgeon, herring, smelt, &c. Lobsters, oysters, clams, and other shell fish are also common. The salmon alone is caught to any considerable extent. There are a number of fisheries near the mouth of the Columbia, and several canning establishments. The total annual value of the salmon fisheries of the state is estimated at \$1,500,000. Most of the animals, birds, and fishes, as well as the trees and other vegetable productions of Oregon, differ from those of the eastern states, and are peculiar to the Pacific coast.—The number of acres of land in farms in 1870 was 2,389,252 (1,116,290 improved and 1,272,962 unimproved); number of farms, 7,587, of which 634 contained less than 10 acres each, 579 from 10 to 20, 1,545 from 20 to 50, 1,409 from 50 to 100, 2,994 from 100 to 500, 338 from 500 to 1,000, and 88 more than 1,000. The cash value of farms was \$22,352,989; of farming implements and machinery, \$1,293,717; wages paid during the year, including value of board, \$719,875; estimated value of all farm productions, including betterments and additions to stock, \$7,122,790; value of orchard products, \$310,041; produce of market gardens, \$105,371; forest products, \$259,220; home manufactures, \$87,376; animals slaughtered or sold for slaughter, \$1,365,737; live stock, \$6,828,675. The productions were 1,794,494 bushels of spring wheat, 546,252 of winter wheat, 3,890 of rye, 72,138 of Indian corn, 2,029,909 of oats, 210,736 of barley, 1,645 of buckwheat, 12,575 of peas and beans, 481,710 of Irish potatoes, 1,970 of sweet potatoes, 1,220 of grass seed, 10,988 of flax seed, 3,847 lbs. of tobacco, 1,080,638 of wool, 1,418,373 of butter, 79,333 of cheese, 9,745 of hops, 40,474 of flax, 11 of maple sugar, 1,207 of wax, 66,858 of honey, 1,751 gallons of wine, 30 of maple molasses, 107,367 of milk sold, and 75,357 tons of hay. The live stock consisted of 51,702 horses, 2,581 mules and asses, 48,325 milch cows, 2,441 working oxen, 69,431 other cattle, 318,123 sheep, and 119,455 swine; besides 12,923 horses and 30,049 cattle not on farms. The live stock

assessed in 1874 was as follows: horses, 65,789; cattle, 232,132; sheep, 388,241; swine, 72,825.

—The number of manufacturing establishments in 1870 was 969, having 88 steam engines of 2,471 horse power, and 236 water wheels of

5,806 horse power; hands employed, 2,884; capital invested, \$4,376,849; wages paid during the year, \$1,120,173; value of material used, \$3,419,756; of products, \$6,877,987. The following are the statistics of the principal branches:

INDUSTRIES.	Number of establishments.	Hands employed.	Capital vested.	Value of products.	INDUSTRIES.	Number of establishments.	Hands employed.	Capital vested.	Value of products.
Awnings and tents.....	1	3	\$5,000	\$56,000	Lumber, planed.....	8	25	40,000	57,850
Blacksmithing.....	118	199	90,063	256,176	" sawed.....	165	692	913,262	1,014,211
Boots and shoes.....	54	88	44,525	98,312	Machinery, not specified.....	2	7	9,000	14,860
Bread and bakery products.....	6	19	12,770	62,345	" engines and boilers.....	6	48	63,000	146,400
Carpentering and building.....	104	248	53,395	417,152	Meat, packed, beef.....	1	3	10,000	37,000
Clothing.....	29	80	33,430	120,700	" pork.....	1	12	50,000	101,750
Flouring and grist mill products	64	165	1,116,825	1,972,444	Quartz, milled.....	4	19	36,200	50,800
Furniture.....	28	58	54,200	68,292	Saddlery and harness.....	32	78	112,892	181,919
Iron castings.....	4	30	23,000	65,000	Sash, doors, and blinds.....	13	52	106,500	97,940
Leather, tanned.....	14	38	35,700	73,555	Tin, copper, and sheet-iron ware	23	61	166,040	158,462
" curried.....	10	21	11,700	73,683	Upholstery.....	5	23	95,500	127,600
Liquors, distilled.....	3	6	13,500	10,760	Wheelwrighting.....	61	98	61,142	106,435
" malt.....	18	30	52,750	74,776	Woolen goods.....	6	173	850,500	492,557

Oregon is divided into three customs districts, Southern Oregon (port of entry, Coos bay), Oregon (port of entry, Astoria), and Willa-

mette (port of entry, Portland). The commercial statistics for the year ending June 30, 1874, are given in the following table:

DISTRICTS.	FOREIGN TRADE.						COASTWISE TRADE.						Vessels belonging in the state.	
	Value of imports.	Value of exports.	ENTRANCES.		CLEARANCES.		ENTRANCES.		CLEARANCES.					
			No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.		
Oregon.....	\$263	\$705,971	1	674	21	14,829	150	168,794	138	160,016	41	2,148		
Southern Oregon.....							2	246	1	218	6	579		
Willamette.....	490,217	1,953,539	49	25,651	75	43,661	157	121,519	79	83,129	61	17,769		
Total.....	\$490,480	\$2,650,510	50	26,325	96	58,490	309	290,559	218	243,363	108	20,496		

The chief exports were 1,680,837 bushels of wheat, valued at \$1,923,351, and 101,847 barrels of flour, valued at \$577,016. Of the vessels belonging in the state, 36, tonnage 2,253, were sailing vessels; 60, tonnage 17,111, steamers; and 12, tonnage 1,132, barges. Twelve vessels, tonnage 1,430, were built in the state during the year. There are two lines of railroad (257½ m. in 1874) in operation in the state, the Oregon and California and the Oregon Central. The former runs along the E. bank of the Willamette and through the Umpqua valley, from East Portland to Roseburg, 200 m., and is to be extended thence to the California line, a total distance of 290 m., to connect with the Oregon division of the Central Pacific railroad. The Oregon Central railroad is to extend from Portland along the W. bank of the Willamette to Eugene City, 124 m., and is completed to St. Joseph, 57½ m. There were 427½ m. of telegraph lines in 1874. In that year seven fire and three life insurance companies of other states and countries were doing business in the state, and there was one national bank (at Portland), with a capital of \$250,000. —The government of Oregon is exercised by a governor (salary \$1,500), a secretary of state (\$1,500), and treasurer of state (\$800), who are chosen by a plurality of votes for four years. The governor must be a citizen of the United States, 30 years of age, and for three

years a resident of the state. The secretary of state is *ex officio* auditor of public accounts. The governor, secretary of state, and treasurer are eligible for reelection for any number of terms, though not for more than two successively. A state printer and superintendent of public instruction (salary, \$1,500) are chosen by popular vote for four years. The legislature is composed of two branches, a senate of 30 members and a house of representatives of 60 members, and is styled the legislative assembly. Senators and representatives are elected by the qualified voters of the respective counties or districts, the former for four and the latter for two years, one half of the senators retiring every two years. They are apportioned among the different counties and districts according to population, and after each decennial state (commencing in 1865) and federal census a new apportionment is made. Senators and representatives must be citizens of the United States, 21 years of age, and for one year residents of their respective districts or counties. A quorum consists of two thirds of each house, and a two-thirds vote is necessary to set aside the governor's veto. Regular sessions are held biennially, commencing on the second Monday of September of even years. Extra sessions may be called by the governor for any period not exceeding 20 days. Members of each house receive \$3 a day (the presiding

officers \$5) and \$3 for every 20 miles of travel, but it is provided that the *per diem* of no member shall exceed \$120. The power of special legislation is restricted. It is provided that the legislative assembly shall not create any debt or liabilities to an amount exceeding \$50,000, except in case of war, or to repel invasion or suppress insurrection, and that no county shall create any debt or liabilities exceeding \$5,000, with the like exceptions; that the state shall never assume the debts of any county, town, or other corporation, except such as have been created to suppress insurrection, &c.; that the state shall not subscribe to or be interested in the stock of any company, association, or corporation, nor shall any county or municipal corporation become a stockholder therein, raise money therefor, or loan its credit thereto; that no money shall be drawn from the treasury for the benefit of any religious or theological institution; and that no bank or moneyed institution shall be incorporated, nor shall any such exist with power to circulate paper money. The judicial power is vested in a supreme court, circuit courts, county courts, and justices of the peace. The supreme court, which has appellate jurisdiction only of final decisions of the circuit courts, and holds one session annually at Salem, consists of five justices elected by districts for a term of six years, one or more retiring every two years. The number of justices and districts may be increased, but cannot exceed seven. A circuit court is held in each county at least twice a year by a justice of the supreme court. These courts have general original jurisdiction, civil and criminal, and appellate jurisdiction and supervisory control over the county courts and other inferior tribunals. A county judge is elected in each county by the qualified voters for four years, who holds a county court with probate jurisdiction and jurisdiction of inferior crimes and of civil cases not involving more than \$500. Justices of the peace have jurisdiction of civil cases not involving more than \$250. Public officers cannot be impeached, but in a criminal proceeding for incompetency, corruption, &c., judgment of dismissal from office may be given; and judges of the supreme court may be removed from office by the governor upon the joint resolution of two thirds of each house of the legislature, alleging cause. The right of suffrage is conferred by the constitution upon every white male citizen of the United States, of sound mind and not a convict, who has attained the age of 21 years and has resided in the United States one year, and in the state during the six months immediately preceding the election, and under the like circumstances upon every white alien who has declared his intention to become a citizen of the United States one year preceding the election. Colored citizens have the right to vote under the federal constitution. Voting is by ballot, and electors may vote in any county of the state

for state officers. General elections occur biennially on the first Monday of June of even years. Amendments to the constitution must be proposed by two successive legislatures and ratified by a vote of the people. The rate of interest in the absence of special agreement is 10 per cent., but as high as 12 per cent. may lawfully be agreed upon. Oregon, having one representative and two senators in congress, has therefore three votes in the electoral college. —The valuation of property, according to the United States censuses, has been as follows:

YEARS.	ASSESSED VALUE.			True value of real and personal.
	Real.	Personal.	Total.	
1850.....				\$5,068,474
1860.....	\$6,279,602	\$12,745,818	\$19,024,915	28,930,637
1870.....	17,674,202	14,124,808	31,798,510	51,585,932

The total taxation in 1870 amounted to \$580,956, of which \$177,653 was state, \$362,753 county, and \$40,550 town, city, &c.; total public debt, \$218,486, of which \$106,583 was state, \$105,903 county, and \$6,000 town, city, &c. The balance in the state treasury on Sept. 1, 1872, was \$172,597 41; receipts during the following two years, \$628,775 01; expenditures, \$663,193 45; balance, Sept. 1, 1874, \$138,178 97 (\$73,014 23 in coin and \$65,164 74 in currency). The current expenses for the two years ending Sept. 1, 1876, were estimated at \$453,350, viz.: legislative expenses, \$30,000; salaries of executive officers, \$15,000; salaries of judges, &c., \$36,600; salaries, &c., of various officers, \$40,000; penitentiary, \$80,000; insane asylum, \$120,000; conveyance of convicts and insane, \$15,000 each; public printing and binding, \$25,000; agricultural college, \$10,000; keeping and tuition of mutes, \$10,000; support of poor, \$5,000; blind school, \$5,000; orphans' aid society, \$3,000; miscellaneous, \$48,750. The total amount of taxes levied in 1873 for state purposes was \$238,482 57, of which \$222,701 57 (55 cents on \$100) was on property and \$15,781 on polls. The equalized value of property for purposes of taxation in 1874 was \$45,688,924 94, including land (3,489,394 acres), \$22,220,381 40; live stock, \$8,116,841; property of corporations, \$2,283,296 49. The actual value is estimated by the secretary of state at from \$100,000,000 to \$150,000,000. The total debt on Sept. 1, 1874, was \$596,256, of which \$247,247 was in bonds bearing interest at 7 per cent., and \$349,009 in warrants bearing interest at 10 per cent. The state institutions are the penitentiary (established in 1854), deaf-mute school (1870), and institute for the blind (1872), at Salem, and the hospital for the insane (1862), at East Portland. The penitentiary has a farm connected with it; a new building of brick has recently been erected. The convicts are employed chiefly in brick making, but also on the farm, in the construction of public

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Value of property.
Baptist, regular.....	26	14	4,350	\$28,200
" other.....	2	2	400	1,000
Christian.....	26	16	4,400	25,000
Congregational.....	8	7	2,300	49,500
Episcopal.....	9	8	1,800	53,200
Evangelical Association...	2	2	550	9,800
Lutheran.....	1	1	800	15,000
Methodist.....	97	49	15,100	113,400
Presbyterian, regular.....	8	7	2,425	38,000
" other.....	12	9	3,250	11,200
Roman Catholic.....	13	14	2,750	94,500
Spiritualist.....	2	2	800	25,000
Unitarian.....	2	1	250	10,000
United Brethren in Christ	10	2	500	1,200
Universalist.....	1	.....	.....	.....
Union.....	1	1	250	1,600
Total.....	220	135	39,425	\$471,100

—The name Oregon was long applied to all the territory claimed by the United States on the Pacific coast, extending from lat. 42° to 54° 40' N. Under the treaty of 1818, the provisions of which were continued in 1827, it was jointly occupied by Great Britain and the United States till 1846, when the latter, by the N. W. boundary treaty, abandoned all claim to the country N. of the 49th parallel, and the name Oregon was restricted to the region S. of that line, to which in turn Great Britain renounced all claim. Though the coast of Oregon had been previously seen by various navigators, its history as known to civilized man may be said to commence with the discovery of the Columbia river by Capt. Robert Gray, who entered its mouth in the American ship *Columbia* from Boston, May 7, 1792, and gave the name of his vessel to the river. By the Louisiana purchase in 1803 the United States acquired whatever title France may have had to this region. The report of Capt. Gray led the administration of Jefferson to send an exploring expedition under the command of Captains Lewis and Clarke across the continent in 1804-'6. The expedition was successful, and gave the Americans an additional title to the country. In 1811 the Pacific fur company, of which John Jacob Astor was the leading member, established a trading post at the mouth of the Columbia river, and called it Astoria; but it was very soon sold to the Northwest fur company to save it from being taken during the war. The Northwest and the Hudson Bay companies, both British associations, for a while separate and afterward united, engaged in trapping and trading, kept many trappers and traders in Oregon until a recent period, for it was only in 1860 that their trading post at Fort Vancouver on the Columbia, a little above the mouth of the Willamette, was abandoned. The Hudson Bay company employed many Canadians among its trappers, and these formed for a long time the main body of the white population. Most of them took Indian wives and were the fathers of numerous half-breed children. In 1833 the emigration of Americans commenced overland, and previous to 1850 several thousand reached

Oregon. In 1848, 1849, and 1850, many of the settlers were drawn away by the gold excitement in California; but in the last named year many arrived from California in consequence of the passage of the "donation law" by congress, giving without cost 320 acres of public land to every person settled on such land before Dec. 1 of that year, and 320 acres more to his wife; and to those persons who should settle between Dec. 1, 1850, and Dec. 1, 1853, 160 acres to each man and 160 to his wife. Under this law 8,000 claims were registered in Oregon. Subsequently the discoveries of gold attracted many settlers. The first attempt at organized government was made in 1841, and resulted in the establishment of an executive and a legislative committee in 1843. In 1845 the legislative committee framed an organic law, which was approved by the people, for the provisional government of the country till the United States authority should be extended over it. The territory of Oregon was organized by the act of Aug. 14, 1848, comprising all the United States territory W. of the summit of the Rocky mountains and N. of the 42d parallel. The territorial government went into operation on March 3, 1849, upon the arrival of Governor Joseph Lane. The act of March 2, 1853, created Washington territory, comprising all of Oregon N. of the Columbia river toward the west and of the 46th parallel toward the east. In 1857 a convention called by the territorial legislature framed a state constitution, which was ratified by the people on Nov. 9 of that year; and by the act of Feb. 14, 1859, congress admitted Oregon into the Union with its present limits. The E. part of the territory was by the same act annexed to Washington territory. Oregon has been troubled with many Indian wars, the last one being the Modoc war in 1872 and 1873. (See *MODOC*.)—See "The Oregon Hand-Book," by J. M. Murphy (Portland, 1873). (See supplement.)

OREGON, a S. county of Missouri, bordering on Arkansas, drained by Eleven Points and Spring rivers, tributaries of the Big Black; area, about 1,650 sq. m.; pop. in 1870, 3,287, of whom 4 were colored. It has an undulating surface and a fertile soil. The chief productions in 1870 were 15,363 bushels of wheat, 127,001 of Indian corn, 16,114 of oats, and 35,376 lbs. of butter. There were 960 horses, 747 milch cows, 2,319 other cattle, 3,153 sheep, and 8,951 swine. Capital, Altou.

OREGON RIVER. See **COLUMBIA RIVER**.

O'REILLY, Alexander, count, a Spanish soldier, born in Ireland about 1725, died in Spain in 1794. He entered the Spanish service at an early age, and was wounded in Italy during the war of the Austrian succession. He afterward served in the Austrian and French armies, reentered the Spanish service, and was made a brigadier. He introduced German tactics into the Spanish army, and was sent to Havana, where he restored the fortifications

and was made inspector general. In 1765 he saved the life of the king during an outbreak at Madrid. On the expulsion of Ulua by the French colonists of Louisiana, O'Reilly was sent there with a fleet in 1768, and began by trying Lafrenière and other popular leaders by court martial and putting them to death for a crime against Spanish authority before Spain had formally taken possession. He then abolished the French laws and substituted those of Spain, with a new black code. A year after he returned to Spain, where all his acts were approved. He commanded an unsuccessful expedition against Algiers in 1775, and was next commandant general of Andalusia and governor of Cadiz, but was for a time in disgrace. In 1794 he was called to command the army of the eastern Pyrenees, but died on the way.

OREL. **I.** A central government of Russia, bordering on the governments of Kaluga, Tula, Tambov, Voronezh, Kursk, Tchernigov, and Smolensk; area, 18,034 sq. m.; pop. in 1867, 1,578,013. The surface is level. The principal rivers are the Desna, a tributary of the Dnieper; the Oka, which runs through the middle of the government toward the Volga; and the Sosna, in the east, which flows to the Don. Limestone, sandstone, and alabaster are abundant, and iron ore is found. The climate is mild and healthy; grain, hemp, flax, and tobacco are raised. About one third of the surface is covered with forests. Beet sugar and coarse linen and woollen cloths are manufactured. **II.** A city, capital of the government, on the Oka, 200 m. S. S. W. of Moscow, with which it is connected by railway; pop. in 1867, 43,575. There is a large trade in hemp, grain, tallow, and cattle. During harvest about 10,000 loaded carts arrive daily. The cathedral, founded in 1794, was not consecrated till 1861; there are eight other national churches, besides chapels for Protestants and Catholics. Orel, founded about 1565 on the banks of the Orlik, above its junction with the Oka, by Ivan the Terrible, was removed in 1679 to its present site in consequence of a great fire. There were also conflagrations in 1848 and 1858.

ORELLANA, Francisco, a Spanish adventurer, born in Trujillo early in the 16th century, died near Montalegro, Brazil, about 1550. He accompanied Francisco Pizarro to Peru in 1531, and took part in the conquest of that country. When in 1540 Gonzalo Pizarro set out to explore the regions east of the Andes, Orellana was second in command of the expedition, which comprised about 350 Spaniards, 4,000 Indians, and 1,000 dogs for hunting down the natives. The river Napo was discovered after a tedious and perilous march, and Pizarro, despairing of returning by the route he had traversed, constructed a brigantine large enough to hold the weaker part of his company and his baggage, and gave the command of it to Orellana, with instructions to keep alongside of the army while it followed by land the course of

the river. After several weeks passed in the descent through a dreary wilderness, their provisions were exhausted, and Pizarro, hearing of a populous and rich district several days' journey down the river at the point where the Napo flowed into a still greater stream, despatched Orellana and 50 soldiers in the brigantine to the confluence of the waters, to procure supplies. The brigantine in three days reached the Amazon, then for the first time navigated by a European vessel (1541). Orellana found the country a wilderness, and altogether unlike what had been represented. To return against the current was difficult, and he resolved to abandon his commander and sail down the great river to the sea. He boldly prosecuted the voyage for seven months, attacked by the warlike natives whenever he attempted to land, and often pursued by them for miles in canoes. He reached the ocean in August, 1541, and sailed to the island of Cubagua, and thence to Spain, where he told that he had passed through a country inhabited only by women, who were warriors and conquerors, and that he had received authentic information of the existence of an El Dorado where gold was so plentiful that houses were roofed with it. After a few years he obtained from the Spanish crown a commission to conquer and colonize El Dorado, and sailed with four ships and 400 men. He lost one ship and 150 men before he reached Teneriffe. Ascending the Amazon some distance, he landed to construct a brigantine; but his last vessel was wrecked, and he died of a fever.

ORELLI, Johann Kaspar, a Swiss philologist, born in Zürich, Feb. 13, 1787, died there, Jan. 6, 1849. He early devoted special attention to the study of languages, and after a course of theological studies he settled in Bergamo, where from 1807 to 1813 he delivered religious discourses in German, French, and Italian. In 1813 he became a teacher in the public school at Coire, and six years later professor of hermeneutics and rhetoric in Zürich. He edited a series of Greek and Roman classics, of which his editions of Horace, Tacitus, and Cicero have received special praise. Among his other publications are *Onomasticon Tullianum* (3 vols., 1836-'8) and *Inscriptionum Latinarum selectarum Collectio* (2 vols., 1828). He was assisted in some of his works by Baiter, and in his turn took a considerable share in Baiter and Sauppe's edition of Plato.—His brother KONRAD was the author of several French grammars, and of a work on the life and doctrine of Spinoza.

ORE MOUNTAINS. See ERZGEBIRGE.

ORENBURG. **I.** A government of Russia, partly in Europe and partly in Asia, consisting of two separated parts, and bordering on Perm, Tobolsk, the Kirghiz steppes (province of Turgai), the Caspian sea, Astrakhan, Samara, and Ufa; area, 73,985 sq. m.; pop. in 1867, 840,704, including Cossacks, Tartars, and other tribes. The surface is diversified with

plains, swamps, small lakes, and the Ural mountains, which traverse it from N. to S. The principal rivers are the Ural, Ilek, Sakmara, Bielaya, Samara, Tobol, Ui, and Miyas. The annual range of the thermometer is very great. Gold, copper, iron, and salt are mined, and large numbers of horses and cattle are raised. The Orenburg line of border fortifications extends about 900 m. from the Caspian to the Tobol. The total number of Orenburg Cossacks is estimated at 60,000. **II.** A city, capital of the government, on the right bank of the Ural, 370 m. S. E. of Kazan; pop. in 1867, 33,431. It is the strongest in the Orenburg line of defences. The streets are broad and regular, but ill paved; the houses mostly of wood. There are ten churches, including one Protestant and one Roman Catholic, and two mosques. The governor's house, the custom house, and the Bashkir caravansary are notable. Woollen cloth, leather, and soap are manufactured, and immense amounts of tallow are melted. Trade with the Kirghiz is transacted at a large caravansary 2 m. E. of the town. Orenburg was founded in 1742.

ORENSE. I. A N. W. province of Spain, in Galicia, bordering on Pontevedra, Lugo, Leon, and Portugal; area, 2,739 sq. m.; pop. in 1870, 402,796. It is traversed by the Cantabrian mountains and watered by the Minho, Sil, Tamega, and Limia. Tin, iron, and copper are found; there are numerous medicinal springs; and wheat, flax, and large quantities of maize are raised. It is one of the poorest provinces in the kingdom. **II.** A city, capital of the province, on the left bank of the Minho, 50 m. S. E. of Santiago; pop. about 11,000. It has a cathedral which dates from the 13th century, a theatre, a prison, and several chapels and convents. The "three marvels" of Orense are its boiling springs, the miraculous image, *el Santo Cristo*, brought in 1330 from Cape Finisterre, and the bridge over the Minho, about 1,400 ft. long and 145 ft. high, built in 1230. Linen, leather, and chocolate are manufactured, and its hams are celebrated.

ORENSE, José Maria d'Albaida, marquis, a Spanish statesman, born about 1802. He has been for the past 40 years a leader of republicanism in Spain, and has been several times arrested and banished. The deposition of Isabella in September, 1868, brought him back to the cortes. After the proclamation of the French republic (Sept. 4, 1870) he urged his countrymen to join the French against Germany, and he proposed at Tours a republican federation of Latin nations. He protested against Amadeus as king of Spain (Nov. 16, 1870), after whose abdication in February, 1873, he was chosen a member of the constituent assembly, but withdrew from the cortes in August.

OREODAPHNE. See LAUREL.

ORESTES, a Greek legendary hero, son of Agamemnon and Clytemnestra. He is represented as the avenger of his father, and the deliverer of his sister Electra, through the mur-

der of his mother. The tragic poets enlarged and embellished the Homeric narrative. According to them, at the time of the murder of Agamemnon it was intended to despatch Orestes, but Electra saved him, and intrusted him to a slave, who carried the boy to Strophius, king in Phocis, whose wife was the sister of Agamemnon. Between Orestes and Pylades, the king's son, sprang up a friendship which has become proverbial. To avenge his father's death, the former went secretly to Argos, pretending that he brought the tidings of Orestes's death. With the complicity of Electra, he killed Clytemnestra and her paramour Ægisthus, but immediately became mad, and was pursued by the Furies until by the advice of Apollo he took refuge with Minerva in Athens. The goddess commanded that his case should be decided by the court of the areopagus; and when they were equally divided, she pronounced him innocent. According to another legend, Apollo directed him to bring from Tauris in Scythia to Athens the statue of Diana which had fallen from heaven. Orestes and Pylades sailed for Tauris, and on their arrival were seized by the natives to be sacrificed to Diana. But the priestess of Diana was Iphigenia, Orestes's sister, and all three escaped with the statue of the goddess. The Furies were now appeased. Orestes ruled over his father's kingdom at Mycenæ, afterward became king of Argos, and married Hermione, daughter of Menelaus. He died of the bite of a snake in Arcadia, and was buried in Sparta. The story of Orestes is the subject of dramas by Æschylus, Sophocles, and Euripides.

OREUS. See HISTIÆA.

ORF (*cyprinus orfus*, Linn.), a species of carp, one of the handsomest of the family, and as an article of food one of the best in the freshwater streams of Europe. It is now very rare. It somewhat resembles the *C. gibelio* or *C. carassius* of Germany, both called the Prussian carp, and may be a mere variety. It can thrive in very dirty water, as it keeps near the surface. (See CARP.)

ORFA. See URFA, and EDESSA.

ORFILA, Mateo José Bonaventura, a French chemist, born in Port Mahon, Minorca, April 24, 1787, died in Paris, March 12, 1853. He studied medicine at Valencia and Barcelona, and the junta of the latter city resolved to defray the cost of his further education in Paris, on condition that he should return thither as a professor. The outbreak of the peninsular war soon deprived him of his pension, but an uncle at Marseilles supplied him with the necessary funds; and the chemist Vauquelin obtained permission for him to stay in Paris. He graduated in October, 1811, and became a private lecturer on chemistry in Paris. The first edition of his *Traité des poisons, ou toxicologie générale* (2 vols.), appeared in 1813-'15. He made application to become a French citizen in 1814, married (July, 1815) a daughter of the sculptor Lesueur, and was elected corresponding

member of the academy of sciences. In 1816 he was nominated a physician to Louis XVIII., in 1819 appointed professor of medical jurisprudence in the faculty of medicine, in 1823 professor of chemistry, and in 1831 dean of that faculty. In 1832 he was chosen a member of the general council of hospitals in Paris, subsequently a member of the general council of the department of the Seine, and in 1834 one of the council of public instruction. As a toxicologist he was without a rival. He organized the clinical hospital, and established a new botanic garden, the museum of pathological anatomy styled *musée Dupuytren*, and the Orfila gallery of comparative anatomy. In 1851 he was elected president of the academy of medicine, and in his will he left to that society and to six other public institutions the sum of 121,000 francs. Perhaps the most original of his works is his *Traité de toxicologie*, which was successively improved until the fifth edition (2 vols. 8vo, 1852). He also published *Éléments de chimie appliquée à la médecine* (1817; 8th ed., 2 vols., 1851), and *Traité des exhumations juridiques* (2 vols., 1831), which was afterward merged in the *Traité de médecine légale* (1823-'5; 4th ed., 3 vols., 1848). He left memoirs of his life which have not yet been published. His contributions to periodicals have been collected and edited by Dr. Beaufort, under the title *Recherches médico-légales et thérapeutiques sur l'empoisonnement par l'acide arsénieux, précédées d'une histoire de l'arsénic métallique* (Paris, 1841).

ORFORD, Earls of. See WALPOLE.

ORGAN (Gr. *ὄργανον*, an instrument), a name applied to several musical instruments closely allied in construction and principle, but more distinctly to the church and concert hall organ, a wind instrument having a great number of pipes of different lengths and sizes, from which sounds are produced by the admission (as determined by keys and stops moved by the performer) of compressed air conveyed to them along various channels from a bellows. The organ (*ʿugab*) mentioned in Genesis (iv. 21) was probably nearly identical with the syrinx or pipe of Pan among the Greeks, consisting of a number of pipes placed together in ranks, according to their succession of tones, and sounded by the mouth. An instrument similar to the Pandean pipe was used by the inhabitants of various parts of Asia, and by almost all semi-barbarous nations. The number of the tubes or reeds as seen on ancient monuments varies from seven to eleven. At what periods any considerable enlargement or improvement in organ building began is not certainly known. Ctesibius in the latter half of the 3d century B. C. invented a hydraulic organ, the *hydraulicon*. A pneumatic organ is also mentioned by some ancient writers. The distinction between these organs is in the manner of supplying air to the pipes. Mersenne describes an organ carved on an ancient monument in the Mattei gardens at Rome, distantly

resembling in form, and in the operation of the keys and the bellows, those of the present day. St. Augustine, commenting on the 56th Psalm, alludes to an instrument inflated by bellows. Pope Vitalian is related to have first introduced organs into some of the churches of western Europe, about 670; but the earliest trustworthy account is that of the one sent as a present by the Greek emperor Constantine Copronymus to Pepin, king of the Franks, in 755. Organs were common in England before the 10th century, and are said to have exceeded in size and compass those of the continent. The largest was obtained by Elfeg, bishop of Winchester, in 951, for his cathedral. They were still very rude in construction and of limited capacity. The keys were broad and large, and were struck with the fist; the pipes were of brass, and harsh in tone. In the 12th century the compass of these organs did not exceed 12 or 15 tones. About this time semi-tones were introduced at Venice. In some of the rude instruments of the same period a plan of concords was so arranged that each key called forth not only its own tone, but also, by other pipes, its octave and 12th above. William of Malmesbury mentions an organ in playing which a wind, "forced out by the violence of boiling water, passing through brass pipes," sent forth musical tones; a device which would seem to have partially anticipated the harsh steam organ, or "Calliope," invented in the United States. Pedals, or foot keys, were added to the organ by Bernhard, a German, in 1470; and in the same century the instrument reached substantially its present form. Among famous builders, the earliest were the family of Antegnati of Brescia, in the 15th and 16th centuries, and after these Serassi of Bergamo and Callido of Venice in the 18th century. In England very few instruments escaped the organoclasts in 1641; at the restoration few eminent builders survived, and foreign artists were called in.—The organ is divided interiorly into four parts, the great, the choir, the swell, and the pedal organ. Some instruments have a fifth or solo organ, while in rare instances there is a sixth or echo. The structural portions of an organ are: 1, the apparatus for collecting and distributing the wind; 2, the mechanism controlling the keys and stops; and 3, the pipes. The force of wind necessary for blowing the organ is ascertained by the anemometer or wind gauge, consisting of a glass tube bent after the manner of that in a barometer, the lower end being fixed into a socket, the other open to the atmosphere. Church organs without the pneumatic lever are usually voiced to a weight of wind of from two and a half to three inches. The pedal stops, when supplied by a separate bellows, are usually voiced to a wind a quarter or half an inch stronger than the above, which accelerates the speech and improves the tone of the large pipes. The tendency, however, is constantly toward voicing instruments to higher pressures for the sake

of the added sonority and brilliancy; and this is greatly facilitated by the pneumatic action hereafter described. The wind, having been collected and compressed, is conveyed to the several main divisions or departments of the organ by means of wooden tubes called wind trunks, and is received into the wind chests. The upper board of a wind chest is something like a chess board, with a pipe set above each square. Each row of pipes from right to left is controlled by a stop, within reach of the performer, and each row from front to back is controlled by a key. If there are 100 sounding stops, there will be from right to left 100 rows of pipes, with 100 perforated boards which slide under the pipes and admit or shut off the wind at the feet of the pipes. No pipe can speak until the drawing of a stop frees the holes at the bottom of the pipes, and a key being struck allows a supply of wind to rush in under the pipes. Each key controls its own separate air-tight compartment or wind reservoir in the wind chest, and each stop has one pipe over this compartment. In the case of mixture stops a cluster of several pipes takes the place of one pipe of an ordinary stop. Besides the stops and keys for the hands to play, there are in organs of the larger class two octaves and a half of large keys placed under the performer's feet, called pedals. There are also pedals and contrivances for moving numbers of stops by one effort, and another pedal which opens and closes a box in which are the pipes of the swell organ. As this swell box opens, the sound is increased. There are also couplers for the different rows of keys. A coupler is an appliance by which one keyboard can be combined with another, or the same clavier can be united to itself in the octave above or below. The sound from each key as controlled by stops varies not only in quality but in pitch. If the stop drawn be a simple diapason, the sound which each key can give is the same in pitch as that obtained from a key occupying a similar position on the keyboard of a piano. If the stop be a double diapason, a tone is given an octave lower than that from a key similarly situated on the piano keyboard. If the stop is called a principal, the note is an octave higher; if a fifteenth, two octaves higher; and if a mixture, a chord of several notes is given. Thus, by putting one finger on an organ key and by drawing six stops, several octaves of notes and a chord can be made to sound. In large organs of 100 stops, more than 100 notes are played by simply pressing one key. Every sound in music gives out feebly in remote octaves every other note of the scale. (See HARMONY.) When these tones, called harmonics, are strengthened judiciously, the result gives the effect of a strong unison note. When a single key is held and 100 stops are drawn, the ear cannot detect the octaves, twelfths, fifteenths, and even discordant intervals which give the strength, they being absorbed in the foundation tone.—Pipes are made

of metal and wood. The chief varieties of metal pipes, as regards form, are the cylindrical, conical, conical surmounted by a bell, inverted cone, and inverted cone surmounted by a bell; while wood pipes are divided into four-sided, three-sided, cylindrical, pyramidal, and inverted pyramidal pipes. All pipes may be divided into two classes, flue pipes and reed pipes. Flue pipes are such as have an oblong opening, called the mouth, at the junction of the body with the foot of the pipe, bounded above and below by two edges called lips. These pipes are made to sound by the wind first passing through a narrow fissure called a flue or wind way, and they depend chiefly on the length or shortness of their bodies for the gravity or acuteness of the sound they produce. Reed or tongue pipes are, on the contrary, those which are made to sound through the medium of a mouthpiece (not unlike that of a clarinet) furnished with an elastic plate of metal. Reed pipes do not depend on the length of the tube of the pipe but on the size of the mouthpiece and the vibrations of the tongue for the gravity or acuteness of the sound. The pitch of the sound produced by a reed pipe is determined by the number of beats or regular vibrations made by the tongue in a second of time; and the reeds are therefore made small or large according to the acuteness or gravity of the sound each is required to emit. The higher the pitch, the smaller must be the reed and the quicker the vibrations of its tongue. In a flue pipe the pitch is governed by the length of the body of the pipe, or more strictly speaking by the length of the column of air within it. By doubling the length the sound produced is an octave lower. The following table exhibits the number of vibrations which take place in a flue pipe, and the number of blows made by striking a reed in a second of time, in producing the several C sounds used for organ-stop measurement, while to the right the shortened length of the pipe is given :

NAME OF C.	Vibrations in flue pipe.	Blows of tongue in reed pipe.	Length of open flue pipe.
C C C C.....	32	16	32 ft.
C C C.....	64	32	16 "
C C.....	128	64	8 "
Tenor C.....	256	128	4 "
Middle C.....	512	256	2 "
Treble C.....	1,024	512	1 "

Organ pipes vary in size from a length of three fourths of an inch to one of 32 ft.—The subject of organ tuning is one of great practical importance as well as of scientific interest. In early times, before the invention of harmony, music for the church was written in simple form and without changes of key. The organ then was tuned upon a system of perfect attunement. When harmony was introduced and the semi-tones added, the system of unequal temperament was adopted, by which certain of the keys most in use were put in nearly perfect

tune. This made it possible to play without offence to the ear on six of the major and three of the minor scales. The remaining scales were so discordant as to be practically useless, as by that system of tempering each of the black keys was tuned either as the sharp of the white key at its left or as the flat of the white key at its right, but not to do duty both as a sharp and flat. To remedy the difficulty, organs were constructed in the 16th and 17th centuries having quarter tones, so as to give both the sharps and flats each by itself. Of course the mechanism of such an instrument became complex, and the difficulties of playing upon it were greatly increased. Johann Sebastian Bach seems to have been the first to advocate the system of temperament by which that inequality existing in every octave known as the wolf is distributed equally among the 12 notes of the octave, so that, while none of them are in perfect tune, none are so much out of tune as to be discordant. He wrote his "Well-tempered Clavier" to enforce his theories. By the adoption of this system of tuning the 24 major and minor scales became at once available, and each tone could be made the keynote of a scale. The scale became what it now is, a series of compromises. This system of equal temperament met with long and strenuous opposition on the part of musicians and organ builders. Among its opponents was Silbermann, the most celebrated organ builder of his day. It was not adopted in England until quite recently. In 1836 George Hogarth, in an article on the organ, said: "The organ in England is tuned on a system of temperament different from that which prevails on the continent, and the effect of which is that the harmony is intolerably impure in all keys which require more than three sharps or three flats." In the system of equal temperament, the pitch of C having been obtained, all the thirds, fourths, and sixths that are tuned upward are made a little sharp, those that are tuned downward rather flat; the fifths being tuned slightly flat upward and slightly sharp downward.—The most important of recent inventions connected with organ construction is the pneumatic power, which has rendered possible effects hitherto deemed unattainable. Organs could not be built previously beyond a certain size, because the performer had not strength enough in his fingers to open the pallets or valves required to feed so many and such large pipes, a force of 20 lbs. in some organs being required to press down a finger key; nor could the wind pressure necessary to produce the power be obtained. Though claimed to be an invention of German origin, and to have been first applied in 1825 by Joseph Booth of Wakefield, England, and by the Scotch organ builder Hamilton, this wonderful power, by which the action of the largest organs is made as light as that of a pianoforte, was not fully known until about 1840, when its mechanism was completed by Mr. Barker, an Englishman residing in Paris.

His invention has been improved in England by several organ builders, especially by Mr. Willis of London, who invented the pneumatics or small bellows which act on the slides. The extreme ease of touch which has resulted from the introduction of the pneumatic lever has not however been without its evil effects. Certain organ builders, for the sake of giving to their instruments power and brilliancy, have increased the wind pressure to even 20 or 30 inches. What they have gained in this way in force they have lost in delicacy. The tone of the instrument becomes bold and vulgar, and unfit for accompanying voices. In 1863 Mr. Barker took out a patent in France for an electro-magnetic contrivance to facilitate the playing of organs, and in 1867 he extended his patent to England. Since then various improvements in it have been patented and several organs built in which the action has been used. It is an exceedingly complicated apparatus, combining both electric and pneumatic action, the connection between the keys and the mechanism which works the pipes being made by insulated copper wires. When a key is struck an electric current passes by means of these through an electro-magnet, the armature of which is so connected with a disk valve as to open it and admit a current of compressed air to act on the pallets. The wires are generally grouped together into one cable, which may be of any length, so that the keyboard may be at one end of the church and the organ at the other. In St. Michael's church, Cornhill, London, the organ and the keyboard are on opposite sides of the chancel, the connection being effected by means of 336 insulated wires gathered in a cable $1\frac{1}{2}$ inch in diameter, and carried under the floor. The pneumatic lever was introduced into this country by the English organ builder Thomas Robjohn, but its present perfection in many important details is due to American organ builders. It has also been applied to moving the stops of the organ. Now, by the pressure of a small knob within reach of the performer's fingers while playing, whole combinations of stops can be drawn out or pushed in, and the changes from fortissimo to pianissimo made almost instantly and by a single touch. An old invention known as the tubular action has quite recently been revived and improved upon with excellent effect. It consists in the substitution of tubes of lead for carrying wind to the pallets in place of the old system of trackers.—The largest organ in the world is in Albert hall, London, and was built by Henry Willis in 1870. It contains 138 stops, four manuals, and nearly 10,000 pipes, all of which are of metal. The wind is supplied by steam power. Thirteen couplers connect or disconnect the various subdivisions of the organ at the will of the performer. The organ at St. George's hall, Liverpool, also built by Mr. Willis, has 100 stops and four manuals. That of St. Sulpice, Paris, is of the same magnitude and has 5,000 pipes. The largest organ in America

is in the music hall, Boston, built by Walcker of Ludwigsburg; it has four manuals, 89 stops, and 4,000 pipes. The other important organs in this country are by American builders, and are as follows: Trinity church, New York, built by Henry Erben; Plymouth church, Brooklyn, by E. and E. G. Hook; St. George's, New York, by George Jardine and son; Tabernacle, Brooklyn, by the same; St. Bartholomew's, New York, by J. H. and C. S. Odell; Temple Emanuel, New York, by Hall and Labagh; and Holy Trinity, New York, by H. L. Roosevelt. These organs have from 2,500 to 4,000 pipes and from 50 to 60 stops, and therefore in point of size will be found equal to the average large organs of Europe. Some of them contain all the modern European and American improvements. One of the largest organs in America is in the Roman Catholic cathedral at Montreal, and was built by Mr. S. R. Warren of that city.—For further details respecting organs, see *Lehrbuch der Orgelbaukunst*, by Prof. T. G. Töpfer (4 vols., Weimar, 1855), and "The Organ, its History and Construction," by Rimbault and Hopkins (London, 1870).—The Alexandre organ, so called, being constructed substantially on the principle of the harmonium, will be considered with the latter under the head of REED INSTRUMENTS. In the barrel or hand organ, a bellows within the instrument is worked by turning a winch, while by the same action, by means of an endless screw, a cylinder or drum is turned, on which the tunes are set in brass pins and staples, at such distances as required by the lengths and succession of the notes, as in the pins studding the cylinder of a musical box. The pins raise keys, which press down stickers, and open pallets or valves, admitting air to the pipes required. The Apollonicon, built many years since in London, was a gigantic barrel organ, 24 ft. high and 30 ft. broad; it could be played by three large cylinders, or by six performers on as many sets of keys. The tone was fine, and the effects grand and novel; but the substitution of mere mechanical action for the skill and taste of the living organist was justly deprecated, and the instrument has not come into vogue. The organolyricon is an extremely complex instrument of French invention, much on the principle of the organ, but combining more distinctly a great variety of instruments and effects, in imitation of a tolerably full band or orchestra.

ORGAN MOUNTAINS. See BRAZIL, vol. iii., p. 218.

ORIFLAMME (Lat. *auriflamma*), the banner of the Capetian kings of France. It was originally that of the abbey of St. Denis, being used in religious ceremonies, and carried also by the counts of Vexin, in their capacity of patrons of the monastery, in the wars they waged for its protection. Philip I. of France having annexed Vexin to his dominions, the charge of carrying the oriflamme devolved upon himself and his successors. Louis VI. raised it for

the first time in 1124. It was disused after the defeat of Agincourt in 1415. It was of red or flame-colored silk, with two notches at its end, adorned with green silk tassels, and hanging from a gilded shaft.

ORIGEN (Gr. Ὠριγένης), a father of the church, born as conjectured in Alexandria, Egypt, about 185, died probably in Tyre in 254. The surname of Adamantius was bestowed on him by early writers on account of his unwearied diligence and ascetic temper. His father, the martyr Leonides, was a teacher of eloquence; and under his tuition and that of Clement of Alexandria, Origen was familiarized from childhood with the works of Plato and the Stoics, as well as with the Scriptures. In 202 Leonides suffered for the faith, and the confiscation of his property left the widow and seven orphans utterly destitute. Origen opened a school, in which he taught at first the ordinary elements of Greek literature, and then expounded the Christian faith to catechumens. But the public school of catechists attached to the cathedral church of Alexandria having been left without teachers in 202 by the flight of its founders, the bishop placed it under the direction of Origen. The new master confined himself to religious instruction. His father's fame and his own attracted a crowd of pupils, many of whom suffered imprisonment and martyrdom. His school was closed by the magistrates, and he was driven from the city. When permitted to return, he resumed his office of teacher, but resolved to lead a life of greater austerity than before. He declined all remuneration for his labor, parted with his select library of pagan authors for a stipend of four oboli a day, slept upon the bare ground, wore only one garment and no shoes, and gave up all stimulating drinks. In 206, interpreting too literally the passage in Matt. xix. 12, he secretly emasculated himself, revealing the circumstance only to the bishop Demetrius. About this time he went to Arabia at the request of a Roman governor. In 210 he avowed himself a pupil of the Neo-Platonist Ammonius Saccas, and about 211 visited Rome, where he was confirmed in his purpose of doing some great work for Biblical scholarship. Relinquishing part of his duties to his assistant Heraclas, he devoted himself to the study of Hebrew, in which he soon became proficient. In 212 he converted the Valentinian Ambrose, whose learning and wealth afterward enabled him to publish his commentaries on the Scriptures. About 219 he was summoned to Antioch to meet the emperor Elagabalus and Mammæa, and made such an impression by his learning and his accomplishments that the persecutions against the Christians declined. On his return to Alexandria, he enlarged the sphere of his teaching so as to make the study of all known philosophy a preparation for the scientific study of Christian theology. Ambrose here not only assisted him in teaching, but purchased manu-

scripts and provided seven amanuenses. Thus appeared at Alexandria his commentaries on Genesis, the Psalms, and the Lamentations of Jeremiah, the first five tomes on the Gospel of St. John, his tract on the resurrection, his *Stromata*, and his work *Περὶ Ἀρχῶν*, "On Principles." This last work, as he afterward wrote to Fabian, bishop of Rome, was published against his will by Ambrose; and its mixture of Christian principles and Platonic philosophy furnished his opponents at a later period with serious matter of accusation. About 228 he was sent by Demetrius, bishop of Alexandria, on a mission to Greece, visited Palestine on his way, and was everywhere invited to preach in the churches, though not yet in holy orders. Without, as it appears, asking the consent of his own bishop, and concealing the impediment of his voluntary mutilation, he was ordained priest. Demetrius not only refused to acknowledge the validity of this ordination, but in two synods held in Alexandria divulged the secret, denied him all clerical rank, and had several of his opinions condemned as heretical. Demetrius is accused by St. Jerome, but without proof, of having been moved by jealousy in these proceedings. Origen, though forbidden to teach in the school of catechists, concluded his fifth tome on the Gospel of St. John, and took refuge with the bishop of Cæsarea. Meanwhile a more numerous synod at Alexandria, after examining his work "On Principles" more in detail, pronounced it heretical and excommunicated its author. Origen was encouraged to open a school of Scriptural exegesis in Cæsarea (of Palestine), and continued there his exposition of the Gospel of John. The bishops of the eastern churches took up the controversy concerning his ordination and heterodoxy; and those of Palestine, Phœnicia, and Arabia pronounced in his favor. In the western church his writings, being comparatively little known, attracted no great notice during his life, but afterward they were generally condemned. The school in Cæsarea continued to flourish, and a large circle of distinguished pupils, among whom was Gregory Thaumaturgus, spread his fame and his principles of interpretation far and wide. He prosecuted all his literary undertakings with increased ardor; wrote a treatise on the "Utility of Prayer" and an "Exposition of the Lord's Prayer;" maintained an active correspondence with the most distinguished bishops of Asia, and was often invited to be present at church councils. During the persecution of Maximin in 236 his friend Ambrose, and Protoctetus, a priest of Cæsarea, were imprisoned and treated with great cruelty, and Origen wrote for their consolation a treatise "On Martyrdom." He was himself obliged to fly from Cæsarea, and found an asylum with Firmilian, bishop of Cæsarea in Cappadocia. The persecution having broken out there, Origen lay concealed for two years in the house of Juliana, and while in this retirement completed his collation of the He-

brew and Greek texts of Scripture, known as the *Hexapla*. In 238 he returned to Cæsarea in Palestine and resumed his labors. He was invited soon afterward to Athens, and finished there his commentary on Ezekiel and began that on Canticles. On the accession of Philip the Arabian, Origen corresponded with his family, and about the same time wrote his defence of the Christian religion against Celsus, his commentary on St. Matthew, and other treatises. In his 60th year (245) he first permitted his discourses to be taken down by short-hand writers. He was frequently consulted by synods on matters of special difficulty; and a numerous council, assembled in Arabia, asked Origen's opinion of the doctrine that the soul dies with the body and is restored to life at the resurrection, which was by him pronounced heretical. In the Decian persecution he was imprisoned and subjected to exquisite and gradually increasing tortures. He wrote from his prison a letter of exhortation and encouragement to his fellow sufferers, but his health was broken down. Many of his personal friends reported that he died under torture at Cæsarea; but others with greater probability affirmed that he died at Tyre in 254. His tomb was preserved for many centuries near the high altar of the cathedral of Tyre.—The writings of Origen were of many kinds, critical, philosophical, polemic, and practical. Most of them are lost. Of those still extant, the principal are parts of the *Hexapla* and *Octapla*, commentaries on the Scriptures, treatises "On Principles," "On Prayer," and "On Martyrdom," and his eight books "Against Celsus." The *Hexapla* was an edition of the Old Testament in six parallel columns, in Hebrew, Hebrew text in Greek letters, and in the four versions of Aquila, Symmachus, the Septuagint, and Theodotion. In some books were added the versions marked 5, 6, 7, whence the name *Octapla*, the two former said to have been found, one in Jericho, and the other at Nicopolis in Epirus. A smaller *Tetrapla* contained only the first four of these versions, without the original text. This splendid work, of such value in the recension and purification of the text of the Old Testament, now exists only in fragments. Many eminent modern scholars have labored to restore the work and edit it from these fragments. The standard edition is that of Montfaucon (2 vols. fol., Paris, 1713). The commentaries of Origen upon the Scriptures cover more ground than those of any other ancient interpreter. They are remarkable for the constant use of the allegorical method. The literal sense is always secondary; and the critic never fails, where it is possible, to find in the simplest fact or the plainest exhortation some hidden meaning. The work "On Principles" remains only in the Latin translation of Rufinus, and in this is not only incomplete, but has been altered by the translator. Editions of this work were published in 1836 by Redepenning in Leipsic,

and by Schnitzer in Stuttgart. The treatise "On Martyrdom," a defence of death for the faith, and an admonition to constancy, is in point of style one of the most finished of Origen's works; it was published by Wetstein (Basel, 1674). But his most celebrated work is his apology for Christianity contained in the eight books "Against Celsus." This is regarded as the most complete defence of the Christian religion that has come down from the ante-Nicene age. The Latin texts of the works of Origen were edited by J. Merlin (2 vols., Paris, 1512); the work "Against Celsus" was first published separately in Latin by Persona (Rome, 1481), and in Greek by David Höschel (Augsburg, 1605) and W. Spencer (Cambridge, 1658; 2d ed., 1677); and the Greek text of his commentaries on the Bible by Huet (Rouen, 1668; Paris, 1679). His complete works were published by the Benedictines C. and C. V. de la Rue (4 vols. fol., Paris, 1733-'59), Lommatzsch (25 vols., Berlin, 1831-'48), and in vols. xi. to xvii. of Migne's *Patrologie grecque*. —On Origen's life and writings, see Schnitzer, *Origenes über die Grundlehren der Glaubenswissenschaft* (Stuttgart, 1836); Redepennig, *Origenes, eine Darstellung seines Lebens und seiner Lehre* (Bonn, 1841-'6); Fischer, *Commentatio de Origenis Theologia et Cosmologia* (Halle, 1846); and Fermand, *Exposition critique des opinions d'Origène sur la nature et l'origine du péché* (Strasbourg, 1861).

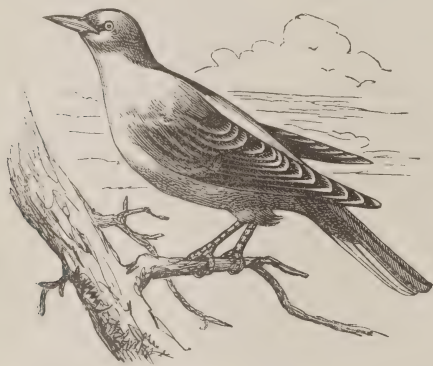
ORIHUELA, a city of Valencia, Spain, in the province and 30 m. S. W. of the city of Alicante, situated in a fertile and beautiful country on the Segura; pop. about 10,000. Several large villages adjoin it. It was under Moorish domination for 500 years, and still has a Moorish look. It has many squares, monasteries, palatial private buildings, churches, including a fine cathedral, several educational institutions, and public libraries. Linen and silks are manufactured. The Moors called it Auriwelah. It was wrested from them in 1264 by James I. of Aragon.

ORINOCO, a river of Venezuela, South America, which falls into the Atlantic by numerous mouths between lat. 8° 40' and 10° N., after a course of about 1,500 m. It rises in the Sierra de Parima, near lat. 3° 40' N., lon. 64° 30' W., and flows mainly W. by S. to lat. 3° 10' N., lon. 66° 20' W., about 20 m. W. of the village of Esmeralda, where its waters are connected with those of the Rio Negro, an affluent of the Amazon, by the Cassiquiare. The Orinoco hence flows N. W. until it receives the Ventuari on the right. There it bends W. S. W., but after being joined by the Guaviare on the left at the town of San Fernando, about lat. 4°, lon. 68°, it sweeps around to the north, receiving several smaller affluents in its course, and gradually verging toward the northeast. Near lat. 6° 20', lon. 67° 45', it is joined on the west by the Meta, which forms part of the N. boundary of New Granada. It continues to flow N. E. to its confluence with the Apure,

lat. 7° 30', lon. 66° 45', whence it flows nearly E. to the sea, its principal tributaries in this part being the Caura and Caroni, both on the right bank. About 130 m. from the sea it forms a delta, by sending to the north a branch divided into several streams called the Boeas Chicas, or small mouths, some of which fall into the gulf of Paria and the rest into the Atlantic. The main stream, called the Boca de Navios, is divided for about 40 m. by a line of islands leaving a channel about 2 m. wide on each side. At the great mouth of the river the breadth is upward of 60 m., but a sand bar extends across the navigable channel in the centre, with but 15 ft. of water. Several of the other mouths are navigable, and the main stream may be ascended for about half its length. It has more than 400 navigable tributaries, and at a distance of 560 m. from the sea is more than 3 m. wide. At Angostura, or Ciudad Bolivar, the head of tide water, 240 m. from the sea, it is 4 m. wide and 390 ft. deep. The region drained by the Orinoco, comprising an area of 250,000 sq. m., is entirely occupied by immense plains, stretching from the coast chain to the Parima mountains, and from the Atlantic to the Andes, rising in some parts to the height of 1,300 ft., but in many places little above the level of the sea. The greater part of these plains is destitute of wood, but there are some dense forests in certain regions on the N. bank, and along the course of the river. The waters of the Orinoco rise from April to October, attaining the greatest height in July and August, which in the upper part of the river is from 30 to 36 ft., and in the lower 24 to 25 ft.; but in one confined place they are said to rise 120 ft. above the usual level. The vast plains through which the river passes are at this season to a great extent overflowed. Two remarkable rapids occur in the upper parts of the Orinoco, called the Maypures or Apures, and the Atures, the one in lat. 5° 8' N., about 80 m. below the junction of the Atabapo and Guaviare with the Orinoco, the other about 36 m. lower down. These rapids are formed by innumerable little cascades succeeding each other like steps, where numerous islands and rocks so restrict the bed of the river that, though the breadth above is upward of 8,000 ft., there only remains an open channel of 20 ft. in width. It is almost impossible to pass these rapids, and in attempting it the canoes of the natives are often dashed to pieces against the rocks. From this place the river is navigated by steam to the Meta. Humboldt and Schomburgk are the principal explorers of the Orinoco.

ORIOLE, the name of a subfamily of dentirostral birds of the thrush family, characterized by a bill as long as the head, broad at the base, compressed on the sides, with elevated and curved culmen and notched tip; wings long, with the first three quills equally graduated, and the third and fourth the longest; tarsi

short and strongly scaled; toes moderate, the lateral ones usually unequal. In the typical genus *oriolus* (Linn.), besides the above characters, the tail is moderate and rounded, and the claws long, strong, and curved. These orioles are migratory, scattered over various parts of the old world; they are usually found singly or in pairs, sometimes in small flocks, on the edges of woods and in fields and orchards, feeding on fruits and insects, flying in an undulating manner from tree to tree; their notes are loud, but mellow and somewhat plaintive; the plumage is generally brilliant yellow, more or less interrupted by deep black markings; the form is stout, and the power of flight considerable; some of them display great ingenuity in the construction of their nests. The European golden oriole (*O. galbula*, Linn.) has the body clear brilliant yellow, the wings and space between the bill and eye deep black; the quills are edged and tipped with yellowish white, which sometimes extends to the tips of the secondaries; a triangular spot of yellow on the closed wing; two central tail feathers black,



European Golden Oriole (*Oriolus galbula*).

the lateral ones with yellow tips increasing to the outside; the female is yellowish green above, shading below into yellowish and pure white, the wings brownish black with an ashy tinge; it is about as large as the blackbird, $9\frac{1}{2}$ in. long. This species is found abundantly in S. Europe, Asia, and N. Africa, and some wander as far north as Great Britain and Sweden. The nest is skilfully made, of the ordinary round shape (according to Yarrell), and placed in the horizontal cleft of a branch, each side of which is included in the substance of the nest; the eggs, four to six, are clear white, with brownish black spots most numerous on the larger end; the parents defend their nests with great courage. Though possessing small powers of song, their beauty makes them in request as cage birds; but they are difficult to raise, and rarely live more than two years in captivity. In the districts where they feed on figs the flesh becomes very fat, and is considered excellent eating; they are very shy. The African golden oriole (*O. auratus*, Vieill.) is

about as large as the preceding species, which it much resembles; but the black stripe on the side of the head extends behind the eye, and there is much less black on the wings; the bill is red; it migrates southerly from equatorial Africa. More than 20 other species are described in Africa, Asia, and the Indian archipelago.—In the genus *sphecotheres* (Vieill.) of Australia, the bill is shorter, stouter, and more curved, and the tail long and even; the species are few, frequenting the tops of lofty trees, feeding on fruits and insects. In the genus *sericulus* (Swains.), also Australian, the bill is longer and more slender, and the wings and tail moderate; these birds live in the large bushes, feeding principally upon figs.—The name oriole is erroneously given to many conirostral birds of the starling family, especially the subfamily *icterinæ* or hang-nests of North and South America. (See BALTIMORE BIRD.)

ORION, a Greek mythical hero, son of Hyrieus, of Hyria in Bœotia, called by the Bœotians Candaon. He was a giant, strong and handsome, and, coming once to Chios, fell in love with *Æro* or *Merope*, the daughter of *Enopion*. To please her, he cleared the island of wild beasts; but *Enopion* constantly put off the marriage, and Orion, being intoxicated on one occasion, forced his way into *Merope's* chamber. To avenge this insult, the father with the aid of *Bacchus* and the satyrs put out Orion's eyes. Having recovered his sight by going toward the east and exposing his eyeballs to the rising sun, he returned to Chios for the purpose of punishing *Enopion*; but being unable to discover him, he went into *Crete*, where he lived as a hunter with *Diana*. Four accounts of his death are given: that he was killed by *Diana* for attempting to violate her; that *Apollo*, indignant at *Diana's* love for him, challenged her to hit with an arrow a distant point in the sea, which proved to be the head of Orion swimming; that, he having been carried off by *Aurora*, *Diana*, to please the indignant gods, put him to death; and that, having boasted he would clear the earth of wild beasts, the earth sent forth a scorpion which killed him. After his death he was placed among the stars, where he appears with a girdle, sword, lion's skin, and club, the brightest constellation in the northern heavens.

ORISSA, an ancient province of India, now forming a commissionership of Bengal, extending about 250 m. along the W. side of the bay of Bengal, and bounded S. by Madras and W. by the Central Provinces; area, 23,901 sq. m.; pop. in 1872, 4,317,999. It consists of three seaboard districts, Balasore in the north, Pooree in the south, and Cuttack between them, with 19 tributary states in the interior. The three maritime districts consist of low and nearly flat plains, varying in width from 9 m. in Balasore to 40 m. in Cuttack. The geological formation of the tributary states belongs to the metamorphic series, and the general surface is composed of successive ranges of mountains

from 2,500 to 3,500 ft. high, stretching seaward from the plateau of central India, and separated by the valleys of the three principal rivers of the province. The greatest river is the Mahanuddy, which waters the southern portion of Cuttack. False Point, at the principal mouth of the Mahanuddy, encloses one of the finest harbors in India. The Chilka lake, in the S. E. corner of the province, near the bay of Bengal, is 44 m. long, 5 to 20 m. wide, and only 3 to 6 ft. deep. It is fresh in summer, but salt in winter. Much salt is made by solar evaporation. The climate of Orissa is hot, wet, and unhealthy. In Cuttack the annual temperature averages 84° , and the yearly rainfall 63.18 inches. The tributary states and the hilly border of the organized districts constitute the forest region. The saul tree is the chief timber product of the interior; resin, lac, and valuable vine fibres are also obtained. Ebony, bamboo, and rattan are produced in Pooree. There are many wild animals, and large coarse oysters are found in Pooree. Rice is the staple crop and main article of food, and pulses are also extensively cultivated. Other products are jute, hemp, flax, tobacco, sugar cane, maize, cotton, and oil seeds. The government has constructed a high level canal from the Brahmani river to the city of Cuttack, and the Kendrapara canal along the N. arm of the Mahanuddy delta. The commerce is chiefly carried on through the port at False Point.—The Indo-Aryan Hindoo race of Uriyas constitute the largest portion of the population. There are several immigrant castes of Hindoos. It is estimated that one fourteenth of the population of Cuttack consists of Mohammedans. The aboriginal races are represented by the Kandhs, Kols, and Savars, all hill tribes. Small communities of native Christians exist in Pooree and Cuttack, and the Roman Catholics and American Freewill Baptists maintain missions in Balasore. The chief towns are Cuttack, the capital, on the Mahanuddy, Jeypoor, Juggernaut, Balasore, and Pooree. The government of the organized districts is administered by a commissioner. The supervision of the native tributary states is intrusted to a superintendent.—Orissa first appears in history as an aboriginal kingdom under the name of Odra, although it is called Kalinga in the ancient Sanskrit records. Prior to 250 B. C. it was colonized by Aryans, and Buddhism subsequently became the religion of the country. About A. D. 500 a Hindoo dynasty rose into power, and Buddhism was gradually supplanted by Brahmanism. About 1590 the Hindoo kingdom was subjugated by the Mohammedan emperor Akbar and became a dependency of the Mogul empire. In 1751 the governor of Bengal ceded it to the Mahrattas, under whose misrule it remained for upward of 50 years. The British permanently annexed it to their dominions in 1803. Orissa has repeatedly suffered terrible famines; the latest occurred in 1866, the mortality of which is variously estimated

at from 750,000 to 2,000,000.—See "Orissa," by W. W. Hunter, director general of the statistical survey of India (2 vols., London, 1872).

ORIZABA, an inland city of Mexico, in the state of Vera Cruz, 160 m. E. S. E. of Mexico; pop. about 20,000. It is on a delightful plain 3,975 ft. above the sea. It has good streets and some fine houses. Of the 12 churches, the parochial alone is noteworthy. There is a very good exchange, a house of refuge, a theatre, two hospitals, and several primary and high schools. The city has many commercial houses, some industrial establishments, and 12 mills. It is one of the principal stations on the railway from Mexico to Vera Cruz. The chief articles of export are tobacco, coffee, sugar, rum, honey, chilli, and tropical fruits.—Orizaba is said to be one of the most ancient towns in America, having existed for many centuries under the name of Izhuatlan. It was seized by Montezuma I. in 1457, and remained subject to the Aztec kingdom until the time of the Spanish conquest. A large number of Spaniards were massacred in 1521 by the natives, who submitted peacefully to the conquerors in 1522. In 1862 Orizaba was the headquarters of the French army of intervention; and in the same year the Mexican troops were completely overthrown in an encounter with the French at the Cerro del Borrego, a high mountain at the edge of the city.—The Pico de Orizaba, or Citlaltepētēl, an extinct volcano, according to recent measurements 17,176 ft. high, and covered with perpetual snow, is 6 m. N. of the city.

ORKNEY ISLANDS (Norse, *Orkneyar*, from *ork*, whale, and *eyar*, islands; Lat. *Orcades*), a compact group lying off the N. coast of Scotland, separated from it by Pentland frith, between lat. $58^{\circ} 44'$ and $59^{\circ} 23' N.$, and lon. $2^{\circ} 24'$ and $3^{\circ} 26' W.$; area, about 500 sq. m., of which about one fourth is under cultivation; pop. in 1871, 31,274. The group includes 67 islands, of which 29 are inhabited. The principal are Pomona or Mainland, Hoy, North and South Ronaldshay, Westray, Sanday, Eday, Stronsay, Ronsay, and Shapinsay. Many of the uninhabited islands are small holms used for pasturage, and others are rocky islets devoid of herbage. Sanday is the most fertile. Hoy alone of the group can be called mountainous, its greatest elevation being 1,600 ft. Geologically the islands belong to the old red sandstone formation, though granite is found near Stromness in Pomona. In the peat mosses which abound throughout the group traces of ancient forests have been discovered, but the climate is now unfavorable to the growth of trees. The soil is chiefly clay and sand, intermixed with peat mosses, and shell marl and bog iron ore are met with. There are no large streams, but springs of pure water abound, and there are several lakes, the largest of which is Stennis, in Pomona, 14 m. in circuit. There is but little frost or snow; the range of the thermometer is from 25° to 75° , and the mean an-

nual temperature is 45°. Until recently agriculture has been neglected, and the manufacture of kelp, the fisheries, and pasturage have been prominent. Much less kelp is produced than formerly, and more land has been brought under cultivation. The small native breeds of cattle, sheep, and ponies have been improved by the introduction of new stock. Rabbits and poultry are numerous, game abounds, and in the season of incubation the cliffs swarm with sea fowl. The cod and herring fisheries are very productive, and large numbers of lobsters are exported. The leading manufacture, employing about 2,000 girls, is straw plait for bonnets; some linen and woollen goods are made; and boat building and sail and cordage making are among the industries. The value of the exports, the chief of which are fish and cattle, is about £200,000 a year. The Orkneys, with Shetland, form a district returning one member to parliament.—*Pomona*, or Mainland, the principal island, is 24 m. long, with a breadth of from 3 to 15 m.; area, about 150 sq. m. The coast is broken up with bold cliffs, but has several good harbors. The surface is moor and moss, with much good pasturage, and a few fertile valleys. On the shore of Lake Stennis, between Kirkwall and Stromness, is a remarkable group of 70 or 80 large symmetrical standing stones, in two separate circles of 100 ft. and 360 ft. diameter, the largest stones in the smaller circle. There are several smaller lakes. Kirkwall, the capital (pop. in 1871, 3,434), is a very ancient place, but has many new and handsome shops and houses. The principal building is the cathedral of St. Magnus, founded in 1138; it is a superb structure of red sandstone in the mixed Gothic and Saxon style, and the choir is used as a parish church. There are also a Presbyterian church, a grammar and other schools, town hall, two libraries, and several charities. Adjoining the cathedral are the ruins of the bishop's and the earl's palaces, and the museum contains numerous ancient relics. The most remarkable discovery, made in 1858, consisted of massive pins, brooches, bracelets, and other ornaments, and silver coins which are believed to have been contemporaneous with the earliest kings in Scottish or Scandinavian history. Kirkwall has a good harbor and a considerable export trade. Stromness, on the S. W. side of the island, 12 m. from Kirkwall (pop. 1,619), is important for its fisheries, and has a convenient and commodious harbor. The red sandstone in the vicinity abounds in rare fossils.—The same Celtic people who colonized S. and N. Britain were the original inhabitants of the Orkneys. The islands were visited by Agricola, A. D. 84, and were afterward favorite resorts of the piratical Northmen. In 876 Harald Harfager subdued both the Orkneys and the Hebrides. On his return to Norway he conferred the administration of his conquest on Ronald, the father of Rollo, the ancestor of William the Conqueror.

In 920 Sigurd, the brother of Ronald, received this dominion from him, and afterward added to it considerable territory on the mainland of Scotland; and the two brothers thus became the founders of a long line of Scandinavian earls who affected the style of independent princes. In 1098 they became subject to the Norwegian crown. When James III. of Scotland married Margaret of Denmark (1469), he obtained the Orkney and Shetland islands as security for her dowry; and as they were never ransomed, they have ever since appertained to Scotland.

ORLÉANAIS, an ancient province of France, near the centre of the country, bounded N. E. by Île de France, E. by Champagne and Burgundy, S. by Berry, W. by Touraine, Maine, and Perche, and N. W. by Normandy. Besides Orléanais proper, it included the districts of Blaisois, Vendômois, Dunois, Sologne, Gâtinais, Beauce or Pays Chartrain, and Perche-Gouet. It was originally the country of the Carnutes and Senones. It was watered by the Loire, Loiret, Loir, Eure, Cher, Beuvron, Yonne, Essonne, and Loing. It has been divided into the three departments of Loir-et-Cher, Eure-et-Loir, and Loiret.

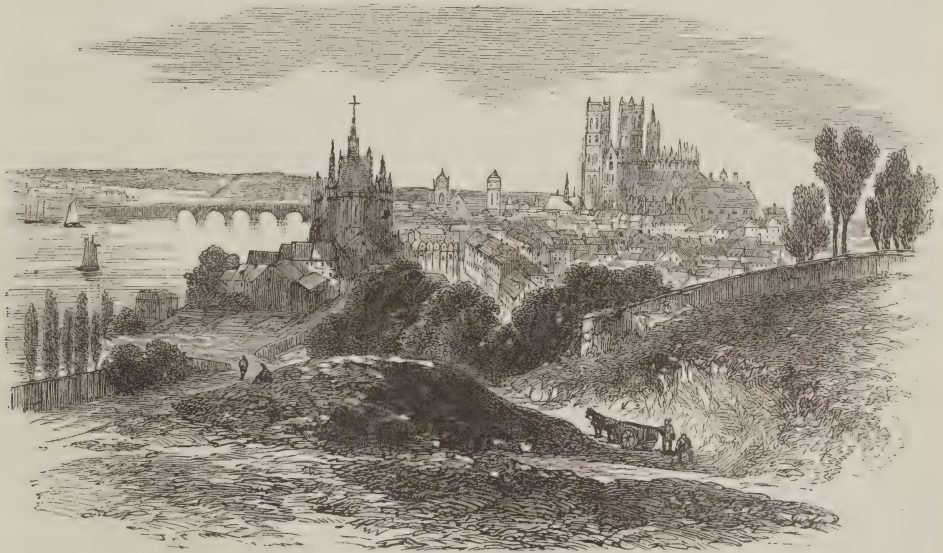
ORLEANS. I. A N. county of Vermont, bordering on Canada, watered by the Black, Barton, Clyde, Lamoille, and Missisque rivers; area, 700 sq. m.; pop. in 1870, 13,364. It has an uneven surface, and lies between the E. and W. ranges of the Green mountains. Numerous small lakes or ponds are scattered over its surface, and Lake Memphremagog extends some distance within its borders. It is intersected by the Connecticut and Passumpsic Rivers railroad. The chief productions in 1870 were 56,432 bushels of wheat, 54,589 of Indian corn, 369,319 of oats, 21,376 of barley, 38,796 of buckwheat, 598,307 of potatoes, 1,738,526 lbs. of butter, 67,079 of cheese, 110,476 of wool, 254,429 of hops, 1,025,502 of maple sugar, and 68,757 tons of hay. There were 5,184 horses, 14,125 milch cows, 1,961 working oxen, 8,037 other cattle, 22,432 sheep, and 3,636 swine; 11 manufactories of carriages and wagons, 6 of sash, doors, and blinds, 13 of starch, 1 of woollen goods, 7 wool-carding and cloth-dressing establishments, 6 tanneries, and 36 saw mills. Capital, Irasburg. **II.** A N. W. county of New York, bordering on Lake Ontario, and watered by Oak Orchard, Johnson's, and Sandy creeks; area, 405 sq. m.; pop. in 1870, 27,689. Its surface is traversed E. and W. by the lake and mountain ridges which divide it into three level or gently undulating plateaus, and the soil is generally fertile. The Erie canal and the New York Central railroad intersect it. The chief productions in 1870 were 550,046 bushels of wheat, 306,972 of Indian corn, 430,768 of oats, 142,785 of barley, 23,063 of buckwheat, 245,097 of potatoes, 134,760 of peas and beans, 793,562 lbs. of butter, 266,282 of wool, 58,258 of tobacco, 68,242 of hops, 25,031 of flax, and 38,996 tons of hay. There were 883 horses, 7,731

milch cows, 6,411 other cattle, 49,615 sheep, and 7,883 swine; 4 manufactories of agricultural implements, 20 of carriages and wagons, 10 of cider, 20 of cooperage, 7 of saddlery and harness, 12 flour mills, and 21 saw mills. Capital, Albion. **III.** A S. E. parish of Louisiana, chiefly on the left bank of the Mississippi river, bounded N. by Lake Pontchartrain, N. E. by the Rigolets pass connecting that lake with Lake Borgne, and S. E. by Lake Borgne; area, about 150 sq. m.; pop. in 1870, 191,418, of whom 50,456 were colored. Since the census it has been somewhat enlarged by the transference of Carrollton from Jefferson parish to New Orleans. The population in 1875 is about 210,000, of whom rather less than one fourth are colored. The city of New Orleans embraces the greater portion of it, the islets at the N. E. extremity, called Les Petites Coquilles, alone not being included within the city limits. It has a low and level surface, and the greater part of it is swampy and liable to overflow from high water, with a general inclination from S. E. to N. W. The W. portion is protected from overflow by levees, and is tolerably well drained. The chief agricultural productions of the parish in 1870 were 14,357 bushels of Indian corn, 2,468 of Irish and 4,540 of sweet potatoes, 751 hogsheads of sugar, 17,910

gallons of molasses, and 825,896 of milk sold. The value of land in farms was \$859,012; of live stock on farms, \$173,690; of farm productions, \$614,128. (See NEW ORLEANS.)

ORLEANS, an island of the province of Quebec, Canada, forming part of Montmorency co., in the St. Lawrence, a few miles below the city of Quebec; area, 69 sq. m.; pop. in 1871, 4,924. It is well wooded, has a fertile soil, and contains several villages and good farms.

ORLEANS (Fr. *Orléans*; anc. *Genabum*, afterward *Aurelianum*), a city of France, capital of the department of Loiret, on the right bank of the Loire, 68 m. S. by W. of Paris; pop. in 1872, 48,976. The ancient fortifications have been demolished, to make room for gardens and public promenades. The cathedral, begun in the 13th century, was partly destroyed by the Huguenots, and reconstructed in the 17th and 18th centuries. The churches of St. Aignan and St. Euverte, the old city hall, an edifice of the 15th century which is now appropriated to a museum of painting and sculpture, the old houses of Agnès Sorel and Francis I., and an equestrian statue of Joan of Arc, are objects of attention. Orleans has a historical museum, a museum of natural history, an academy of sciences, belles-lettres, and arts, and a public library of about 50,000 volumes. There are



Orleans.

manufactures of hosiery and woollen and cotton blankets, numerous sugar refineries, breweries, and tanneries; and the town is an important railway centre.—Ancient Genabum was destroyed by Cæsar, and, being rebuilt by Aurelian, took his name. Attila with his Huns appeared before its walls in 451; but the timely intervention of the Roman general Aëtius rescued it from danger. It was conquered by Clovis in 496, and under his successors became

the capital of one of the Frankish kingdoms. It was pillaged by the Northmen in 856 and 865. Louis the Fat was crowned there in 1108, and a university was established in 1309. After the accession of the house of Valois it became the capital of a duchy, which was bestowed successively upon various princes of the royal family. It adhered faithfully to the French kings during their long wars with the English. In October, 1428, the latter, under

Salisbury, laid siege to the city, whose inhabitants resisted heroically; it was finally rescued, April 29, 1429, by Joan of Arc. The states general convened there in 1560. The Calvinists in 1562 seized upon this stronghold, and it was besieged in 1563 by the Catholics under the duke of Guise, who was assassinated during the siege. In 1552, during the war of the Fronde, the duchess of Montpensier, daughter of Gaston of Orleans, held it against the king. In the Franco-German war of 1870-'71 its neighborhood was the scene of protracted and hotly contested battles. On Oct. 10 Gen. von der Tann, with the first Bavarian army corps and other troops, drove back the advance guard of the "army of the Loire" (Gen. Lamotte-rouge) from Artenay, and moved toward Orleans; on the 12th he defeated the main army and took possession of the city. By the beginning of November, however, the French army of the Loire had been heavily reinforced, and Gen. Aurelle de Paladines, during the first week of that month, advanced at the head of 150,000 men with the design of recapturing the place. Von der Tann, greatly outnumbered, preferred to receive the attack in the open country, and on Nov. 8 evacuated the town (leaving only a regiment of infantry) and took up a strong strategic position near Coulmiers, where a fierce battle began on the 9th. Von der Tann held his ground till night, and then made an orderly retreat; the troops left in Orleans withdrew, and the French reentered it on the 10th. Aurelle failing to follow up his advantage, the Germans were allowed to reinforce their army undisturbed; and when later in the month Aurelle attempted to send a great part of his army toward Paris, he encountered a strong force (10th corps, of Frederick Charles's army), which he attacked near Beaume-la-Rolande, and was defeated and forced back to Neuville-aux-Bois near the city. Here the 10th Prussian corps again defeated him on Dec. 3; and on the same evening all the other principal French positions around the city were successfully assailed. The attack was continued on the 4th, and by 9 at night the Germans had pressed forward to the city itself. An entrance was forced by the grand duke of Mecklenburg's division, and violent street fighting was going on, when the commander of the city surrendered to the grand duke, who occupied it at midnight (Dec. 4-5). Prince Frederick Charles made a formal entry on the 5th, and the Germans held Orleans to the end of the war.

ORLEANS, Duchy and Families of. That region in France of which the city of Orleans was the capital formed successively a viscounty and a county under the Carlovingian and Capetian dynasties. Philip VI. of France erected it in 1344 into a duchy and peerage, and bestowed it as an apanage upon his son Philip, who died in 1375. Besides several princes of the royal family who occasionally bore the title, it was subsequently held by three families

or branches: 1, that of Orleans-Valois (1392-1498), consisting of three dukes, Louis I., second son of Charles V. of France; Charles, the poet; and his son Louis II., who ascended the throne as Louis XII.; 2, the first house of Orleans-Bourbon (1626-'60), which had but one duke, Gaston, brother of Louis XIII., who died without male issue; 3, the second house of Orleans-Bourbon (1660-1842), which originated with Philippe, the brother of Louis XIV. and husband of Henrietta Anna of England; it reckons among its members Philippe, the regent under the minority of Louis XV., Louis Philippe Joseph, known as Philippe Egalité during the French revolution, and King Louis Philippe, whose eldest son, Ferdinand Philippe, who died in 1842, was the last who held the title of duke of Orleans.—Of the various families of Orleans, the following are the most important members.

I. Louis, the head of the family of Orleans-Valois, born in 1371, assassinated Nov. 23, 1407. The second son of King Charles V. by Jeanne of Bourbon, he was first styled duke of Valois, then of Touraine, and finally of Orleans in 1392. He married Valentina Visconti, a Milanese princess, by whom he had several children. When his brother Charles VI. was seized with madness, he tried to share the power with his uncles, and through the influence of Queen Isabella secured a considerable part in the administration. On the death of Philip of Burgundy in 1404, he had for a while the full control of affairs, under the title of lieutenant general of the kingdom, in concert with the queen; but his maladministration soon made him unpopular, and John the Fearless, son of Philip of Burgundy, was hailed as a liberator when he presented himself before the gates of Paris. The rivalry between the two princes foreboded civil war; but the duke of Berry, their uncle, brought about a seeming reconciliation, Nov. 20, 1407. Three days later the duke of Orleans fell a victim to assassins hired by the duke of Burgundy. This murder gave the signal for civil wars between the Burgundians and the Armagnacs, the latter being the adherents of the family of Orleans.

II. Charles, eldest son of the preceding, born in Paris, May 26, 1391, died in Amboise, Jan. 4, 1465. He was educated under the supervision of his mother, and became familiar with the poems of the French trouvères and of the great Italian writers. On his father's death he showed little executive ability, and when his mother died in 1409 he signed with John of Burgundy a treaty of peace, styled the *paix fourrée* by French historians. But his party soon found a more energetic leader in Count Bernard of Armagnac, whose daughter Charles married in 1410, his first wife, the widow of Richard II. of England, having died the previous year. Under direction of Bernard civil war was renewed, but was terminated by the peace of Arras in 1414. Charles joined the French army under the constable d'Albret in

1415, fought bravely at Agincourt, was wounded, taken prisoner, and carried to England, where during his captivity of 25 years he composed a series of miscellaneous poems. He was permitted to return to France in 1440, on condition of paying a ransom of 200,000 gold crowns and not bearing arms against England. He now married Mary of Cleves, who 22 years later bore him a son who was afterward Louis XII. On the death of his uncle Filippo Visconti, after a fruitless attempt to take possession of the duchy of Milan, he obtained the county of Asti, his mother's dowry. Toward the close of his life he became involved in political intrigues against Louis XI., but the monarch treated him with contempt, and the duke is said to have died of grief in consequence. His poems were brought to light in 1734 by the abbé Sallier. The best manuscript copy of them is in the British museum. The English portion of them was printed for the Roxburghe club (4to, London, 1827). **III. Jean Baptiste Gaston**, the youngest son of Henry IV. and brother of Louis XIII., born at Fontainebleau, April 25, 1608, died in Blois, Feb. 2, 1660. He was first known under the title of duke of Anjou, and early showed signs of opposition to his brother's minister Richelieu, shared in all the conspiracies against him, and on every occasion was frightened into submission and the betrayal of his friends. He consented to marry Mlle. de Montpensier, the richest heiress in France, whom he had previously refused; she bore him an only daughter, afterward greatly celebrated under the title of Mademoiselle, and died suddenly. He and his mother, and nearly all the courtiers, were utterly worsted by Richelieu in the imbroglio known as the *journée des dupes*, October, 1630. The next year, his mother having fled to Brussels, he issued a threatening manifesto against the minister, repaired to the court of Charles III. of Lorraine, whose sister he secretly married notwithstanding the prohibition of his brother, and then, joining his mother, entered into a new plot which ended in open rebellion. The governor of Languedoc, Henri de Montmorency, was persuaded to take part in it, but was deserted by Gaston at the battle of Castelnaudary, in September, 1632. Gaston submitted to terms dictated by Richelieu, but soon escaped again to Brussels, where he made his marriage known. The minister, taking advantage of this avowal, made the duke of Lorraine pay for his brother-in-law's revolt, and caused his duchy to be forcibly occupied in 1634, the king in person taking the city of Barle-duc. Gaston was spared, as "being of the royal blood of France, which must be respected," but received orders to retire to Blois. In 1636 he was privy to, if not an accomplice in, a plan for the assassination of Richelieu. In 1642 he shared in the conspiracy of Cinq-Mars, and negotiated personally with Spain; but the secret having been divulged and Cinq-Mars arrested, he gave evidence which sent his accomplice to the scaffold. He evinced some personal

bravery in 1644-'6 at the head of the French army in Flanders; but during the war of the Fronde he served and betrayed by turns the king, the princes, the parliament, and the popular party. He was finally exiled to Blois. He left *Mémoires de ce qui s'est passé de plus remarquable en France de 1608 à 1635* (Amsterdam, 1683). **IV. Philippe II.**, regent of France during the minority of Louis XV., born at St. Cloud, Aug. 2, 1674, died in Paris, Dec. 2, 1723. He was the second duke of the second house of Orleans-Bourbon, and the son of Philippe I., brother of Louis XIV., by his second wife, Elisabeth Charlotte of Bavaria. Until his father's death in 1701 he bore the name of duke of Chartres. He was highly gifted and accomplished; but from his sub-preceptor, the abbé Dubois, he learned infidelity and immorality. By his advice he married in 1692 Mlle. de Blois, natural daughter of Louis XIV. by Mme. de Montespan, a union no less distasteful to his parents than to himself. He distinguished himself at the siege of Mons in 1691, and in the taking of Namur in 1692, and was wounded at the battle of Steenkerk. In 1693, at Neerwinden, leading the light cavalry, he displayed such skill and bravery that the jealousy of Louis XIV. obliged him to leave the army. His forced inactivity led him into dissipation, but he devoted a portion of his time to painting and natural philosophy. After the death of Charles II. of Spain he signed, in conjunction with his father, a protest against the late sovereign's will, which ignored their rights to the Spanish crown in case the elder Bourbon line should become extinct. In 1706 the king appointed him commander of the French army in Italy, but placed him in fact under the control of Marshal Marsin, who, opposed by Prince Eugene, lost the battle of Turin, Philippe trying in vain by skilful manœuvres to retrieve the fortune of the day. In 1707 in Spain he subdued the provinces of Valencia, Aragon, and Catalonia, took Lérida, which 60 years before had frustrated the efforts of the great Condé, successfully conducted several expeditions in 1708, and was received with great honors in Madrid. Suspected of aspiring to the crown of Spain, he was recalled to France, was obliged to make a formal renunciation of all his claims or pretensions to the Spanish throne, and forbidden to appear again at Versailles. Once more exiled from active life, he devoted much of his time and money to chemical experiments, and was charged with poisoning the dauphin, the duke and duchess of Burgundy, and their second son, in order to open his way to the throne. He repelled the accusation, and insisted upon a trial, his chemist at the same time offering to surrender himself; but Louis XIV. gave him no opportunity of publicly establishing his innocence, though Philippe vindicated his good name afterward by the paternal care which he bestowed upon the infant king, then the only bar between him and the throne. After the death

of Louis XIV. he persuaded parliament to set aside the royal will, to place the regency exclusively in his hands, and to confide to him the guardianship of young Louis XV. He was regent from Sept. 2, 1715, to Feb. 22, 1723; and during his administration, especially in the early part of it, he had to contend against many adverse circumstances. The state was deeply in debt; provinces had been desolated by protracted wars; commerce was completely paralyzed. After attempting several measures of relief, in 1716 the regent adopted John Law's plan of a national bank, which for a time created a fictitious prosperity, but in 1720 ended in a terrible crash and an increase of the public debt. Some retrenchment and reform however was effected. The regent abandoned altogether the foreign policy of Louis XIV. Yielding to the representations of Dubois, who received a large pension from the English government, he concluded, Jan. 4, 1717, with Great Britain and Holland, the treaty known as the "triple alliance," by which he consented to expel the pretender from France, to discontinue the fortifications at Mardyck, to destroy the port of Dunkirk, and not to increase the French navy, giving up at the same time all right to trade in the South sea. Meanwhile Alberoni, prime minister of Philip V. of Spain, was devising plans to overthrow the house of Hanover in England and the regent in France, and restore Spain to her former rank as a ruling power in Europe. A conspiracy plotted in Paris by the Spanish ambassador Cellamare, the duchess of Maine, and some discontented noblemen in Brittany, was discovered by Dubois; but the regent contented himself with sending the ambassador back to Spain and the duchess to her château at Sceaux, and executing four of the insurgent Bretons. But this plot led to active hostilities with Spain; and Austria having joined the triple alliance in 1718, the English destroyed the Spanish fleet, and Berwick stormed some of the northern strongholds of Spain. Alberoni, whose plans were baffled, was expelled from Spain, and by the treaty of Madrid, January, 1720, part of western Europe was remodelled, mainly through the influence of the abbé Dubois, who rose to the rank of cardinal and archbishop. After Louis XV. was declared of age, Dubois continued prime minister for about six months, and on his death the duke of Orleans resumed the reins of government in that capacity; but his constitution had been shattered by debauchery, and before the end of four months he died of apoplexy. By his marriage with Mlle. de Blois he had one son, Louis (1703-'52), and six daughters. A natural son, Jean Philippe, known as the chevalier d'Orléans, became high prior of the order of St. John of Jerusalem, and a grandee of Spain. **V. Louis Philippe Joseph**, styled Philippe Égalité, the fifth duke of his house, and great-grandson of the regent, born at St. Cloud, April 13, 1747, guillotined in Paris, Nov. 6, 1793. Under the title of duke

of Chartres, which he bore till 1785, he married in 1769 Louise Marie Adélaïde of Bourbon-Penthièvre, great-granddaughter of Louis XIV. and Mme. de Montespan, who, owing to her brother's death, brought her husband the rich inheritance of her house. He increased his immense fortune by speculation, and constructed three of the rows of buildings around the garden of the Palais Royal. He early showed signs of opposition to the court, and in 1771 signed the protest of the princes against the dissolution of the ancient parliaments. Queen Marie Antoinette felt an instinctive antipathy to him, and he conceived a violent hatred toward her, which occasionally broke out in open hostility. In 1776 he became the head of "the princes' party," in opposition to that of the queen, and charged Marie Antoinette with instigating the wrongs and insults he received from Louis XVI. His claims to the office of grand admiral of France being disallowed, he participated in 1778 as a volunteer in the naval battle of Ushant, when the highest praise, soon followed by ridicule, was bestowed upon his conduct; he was then recalled, and received the empty title of colonel-general of hussars. After a visit to London, where he was intimate with the prince of Wales, afterward George IV., he devoted himself to pleasure and dissipation. During the famous diamond necklace trial, he denounced Marie Antoinette, and is charged with having encouraged the libellous publications of the countess of Lamotte. In 1787 he appeared in the assembly of notables, and plotted with the most ardent members of the parliamentary opposition. He opposed the financial policy of the government, and was consequently exiled to Villers-Cotterets. The popularity thus acquired was enhanced by his lavish expenditure of money to relieve the sufferings of the people during the severe winter of 1788-'9, and in the succeeding elections for the states general he was chosen at Paris, Villers-Cotterets, and Crespy in Valois. He was among the first nobles who joined the deputies of the third estate, and aided in transforming the states general into a national assembly. The Palais Royal became the headquarters of revolutionary demonstrations, and thence came the signal for the storming of the Bastille. The events of Oct. 5 and 6, 1789, were generally ascribed to the Orleans party; the duke himself was accused by the *Châtelet*; but the assembly declared there was not sufficient reason to allow one of its members to be arraigned before a tribunal. Lafayette, however, forced him by threats to go to London, where he remained for nine months. On his return, July 11, 1790, there were some attempts at a reconciliation between him and the court; he had been at last promoted to the admiralty; but the treatment which he received from the courtiers estranged him for ever, and incited him to further revolutionary projects. But his wavering and pusillanimous conduct disheartened

his adherents, and Mirabeau, who had favored his aspirations to the throne, turned from him in disgust. On the flight of the king from Paris he permitted the best opportunity for the accomplishment of his plans to escape, without even the show of an attempt. His party, however, continued to foster popular movements, and the duke freely mingled with the Jacobins, the Cordeliers, and the members of the revolutionary commune of Paris. He now dropped his patronymic to assume the surname of *Égalité*, was elected to the convention, and took his seat among the *montagnards*. On the trial of Louis XVI., either of his own accord or through compulsion and fear, he voted for the death of his cousin. But this did not secure him the confidence of the revolutionists, who suspected him of sinister designs; and such suspicions were enhanced by the plot of Dumouriez to reestablish the constitution of 1791 and restore royalty. The committee of general security ordered him to be arrested, April 6, 1793, as well as all the members of his family. He was tried at Marseilles and acquitted; but on the proscription of the Girondists, he was brought back to Paris by order of the convention, Nov. 5, arraigned the next morning before the great revolutionary tribunal, found guilty on several false or frivolous charges, and sentenced to death. On hearing this verdict, he exclaimed: "Since you were determined on my death, you ought at least to have put forth more reasonable grounds for my condemnation!" and he insisted upon being at once taken to the scaffold. He thenceforth evinced remarkable self-possession, firmness, and dignity, and met his fate without the slightest perceptible emotion. His virtuous wife was a prisoner through the revolution, and on her release in 1797 received a pension of 100,000 francs from the government, went to Spain, and thence to Palermo. She returned to France in 1814, and died in 1821. Besides Louis Philippe, she had two sons: Antoine Philippe, duke of Montpensier (1775–1807), who left interesting personal *Mémoires*, contained in Baudouin's and Barrière's collections, and Alphonse Léodgar, count of Beaujolais (1779–1808); and one daughter, Louise Marie Adélaïde Eugénie (see ADELAÏDE). These children were early separated from their mother and confided to the care of Mme. de Genlis. **VI. Ferdinand Philippe Louis Charles Henri Joseph**, the eldest son of King Louis Philippe and grandson of the preceding, born in Palermo, Sept. 3, 1810, died near Paris, July 13, 1842. As duke of Chartres, he was educated in the college of Henry IV. In 1825 he was appointed by Charles X. colonel of the first regiment of hussars. He was in garrison at Joigny at the time of the outbreak of July, 1830, upon which he hastened to Paris at the head of his regiment, and by the election of his father to the throne became duke of Orleans and prince royal. He served in Belgium under Marshal Gérard, led the advanced

guard of the French army, and had a share in the siege of Antwerp. In 1835 he fought several battles with the Arabs in Algeria, and was wounded on the banks of the Habrah. He married Helena of Mecklenburg-Schwerin, May 30, 1837. In 1839 he went again to Africa, and led one of the divisions of the army which, under Marshal Valée, forced the defile of Bibans or the Iron Gates. In 1840 he commanded the expedition against the province of Tittery, routed the tribes headed by Ben Salem, forced the pass of Mouzaiah, defended by Abd-el-Kader himself, carried Médéah and Milianah, and thus secured to the French the right bank of the middle Shelliff. In 1841 and 1842 he busied himself in France in improving the organization of the army. He was on his way to Neuilly to visit his parents when his horses became ungovernable, and in jumping from his carriage he fell on the pavement and fractured his skull. He was taken to a neighboring house, where he expired after a few hours. The duke of Orleans was very popular, and his death was universally lamented. **VII. Hélène Louise Elisabeth**, wife of the preceding, and daughter of Prince Frederick Louis of Mecklenburg-Schwerin, born at Ludwigslust, Jan. 24, 1814, died in Richmond, England, May 18, 1858. On the death of her husband she devoted herself to the education of her two sons, Louis Philippe Albert, count de Paris, born Aug. 24, 1838, and Robert Philippe Louis Eugène Ferdinand, duke de Chartres, born Nov. 9, 1840. A few months after her husband's death Louis Philippe caused a bill of regency to be presented to the two chambers, by which she was deprived of the rights which belonged to her according to previous usages of the French monarchy. She appeared with both her sons in the chamber of deputies on the eventful Feb. 24, 1848, and was on the point of being proclaimed regent when the hall was invaded by the mob. She was obliged to retreat to the Hôtel des Invalides in company with her brother-in-law the duke de Nemours, and finally with her sons reached Belgium in safety. She accepted the hospitality extended by her maternal uncle, the grand duke of Weimar, and settled at Eisenach. When the prospects of her son for the throne of France were blasted by the success of Napoleon III., disappointment preyed upon her mind; her health failed, and during a visit to her husband's family in England she died. A collection of her letters has been published, and a memoir of her life translated by Mrs. Austin from the French (8vo, London, 1859). —The decree of perpetual exile of the Orleans family, passed May 30, 1848, was abrogated by the general assembly at Versailles in June, 1871; and in November, 1872, a bill was passed restoring their immense estates, confiscated by Napoleon III., June 22, 1852. For accounts of other members of the family see AUMALE, CHARTRES (duke de), JOINVILLE, LOUIS PHILIPPE, MONTPENSIER, NEMOURS, and PARIS (count de). **ORLEANS, Maid of.** See JOAN OF ARC.

ORLOFF, the name of a Russian family which rose into consequence early in the 18th century. **I. Ivan**, the founder of the family, was one of the corps of strelitzes who in 1689 were induced by the princess Sophia to mutiny against her brother the young czar Peter (the Great). Being sentenced to death, he showed such coolness upon the scaffold that he was pardoned, and obtained a commission in the army. He adopted the name of Orloff. **II. Grigori Grigorievitch**, grandson of the preceding, born in 1734, died in Moscow in 1783. He became an aide-de-camp of Gen. Shuvaloff, with whose mistress, the princess Kurakin, he had an intrigue which brought him under the notice of Catharine II., then grand duchess, who took him under her protection. He was instrumental in the deposition of her husband, Peter III., and in establishing her upon the throne (1762); a service which gained him the first honors of the empire, including the title of count, conferred also upon his four brothers, who had assisted him. He vainly aspired to the hand of the empress. His fickleness and indiscretion alienated her affections, and to rid herself of a discarded lover she charged him in 1771 with measures for arresting the plague in Moscow. His courage and devotion in the performance of this duty reinstated him temporarily in the good graces of Catharine; but during his absence in Wallachia to negotiate a peace with the Turks, he was supplanted by another favorite, and on his return to St. Petersburg the empress exiled him to the castle of Tzarskoye Selo. After wandering over Europe he became insane, and died in that condition. He left a son by the empress, called Count Bobrinski. **III. Alexei**, brother of the preceding, born in 1737, died in Moscow in 1808. He entered the army, and attracted the favorable notice of Catharine II. by the daring part he played in the deposition of Peter III. He is said to have strangled Peter in prison with his own hands. In 1768 he was appointed admiral of the fleet in the Grecian archipelago, and by the assistance of a British officer named Elphinston he gained brilliant successes over the enemy off Scio and Tchesme (July 5-7, 1770), for which he received many marks of honor, including the surname of Tchesmenskoi. He was exiled from court by Paul, and passed the remainder of his life in travelling or on his estates. **IV. Fedor**, brother of the preceding, born in 1741, died in Moscow in 1796. He served in the army against the Turks, and became general-in-chief. He left four illegitimate sons, by whom the male line of the Orloffs has been continued. **V. Alexei**, son of the preceding, born in 1787, died in St. Petersburg, May 21, 1861. He entered the army at an early age, and, after participating in the campaigns ending with the peace of Paris in 1814, became aide-de-camp to Alexander I., and colonel of a regiment of horse guards. During the formidable insurrection in St. Petersburg which followed the accession

of Nicholas (1825), the energy of his movements and the loyalty of his troops contributed much to crush the rebels. He was made a count, appointed adjutant general, and in 1828 fought against the Turks. In 1829 he negotiated the peace of Adrianople, and during the Polish insurrection of 1830-'31 he was commissioned to supervise the operations of the Russian generals in Poland. The sudden deaths of Marshal Diebitsch and the grand duke Constantine gave rise to an accusation (probably unjust) of poisoning against Orloff. His next important service was the negotiation of the secret treaty of Unkiar-Skelessi, July 8, 1833, for the closing of the Bosphorus and Dardanelles against all but Russian ships of war. In 1844 he took charge of the secret police of Russia, and became one of the most formidable personages in the empire. After the death of Nicholas he exercised an equal influence in the councils of Alexander II. In 1856 he represented Russia at the congress of Paris as first plenipotentiary, after which he was appointed president of the grand council of the empire, and was made a prince. **VI. Nikolai**, prince, a Russian diplomatist, son of the preceding, born in 1827. He distinguished himself as a soldier in the Crimea, losing an eye. In 1859 he became minister at Brussels, and afterward lieutenant general and aide-de-camp of the emperor. In 1872 he was appointed ambassador in Paris; and in January, 1875, President MacMahon gave him the grand cross of the legion of honor. He has written a work on the campaign in Prussia in 1806 (St. Petersburg, 1856).

ORME, Robert, an English author, born in Travancore, India, in 1728, died at Ealing, England, Jan. 13, 1801. He was educated at Harrow, and in 1742 went to Calcutta and engaged in business. In 1757-'8 he was commissary and accountant general in the East India company's civil service. In 1760 he settled in London, and was appointed historiographer of the East India company. He wrote "History of the Military Transactions of the British Nation in Indostan from the Year 1745" (2 vols., 1763-'78), extending to the peace of 1763; "Historical Fragments of the Mogul Empire from the Year 1659" (8vo, 1782); and "A General Idea of the Government and People of Indostan" and "Origin of the English Establishments at Broach and Surat," published posthumously, together with the "Historical Fragments" and a life of the author (4to, 1805).

ORMOND, James Butler, duke of, lord lieutenant of Ireland, born in London in 1610, died at Kingston hall in Dorsetshire, July 21, 1688. He was educated by Archbishop Abbot as a ward of King James, and in 1632 succeeded his grandfather as earl of Ormond. When the Irish rebellion broke out in 1640 he was chosen commander of the royal troops, and repeatedly repulsed the rebels. Being ill supported, he was forced to make terms of peace which created much dissatisfaction in

England; yet he was created marquis and made lord lieutenant of Ireland in 1644. After the success of the parliamentary party, he resigned his office and retired to France. Returning to Ireland, he attempted to restore the royal power, caused Charles II. to be proclaimed, and made an unsuccessful effort to capture Dublin. After the restoration he was raised to a dukedom. He was again appointed lord lieutenant of Ireland in 1662, and held the office seven years. In 1670, while riding in his carriage in London, he came near being assassinated by the notorious Col. Blood and five accomplices. (See BLOOD, THOMAS.) He was again lord lieutenant of Ireland from 1676 to 1685. He survived his son, "the gallant" earl of Ossory, eight years. Ormond's life and the history of his Irish administration was written by Thomas Carte (3 vols. fol., London, 1735-'6; new ed., 6 vols. 8vo, Oxford, 1851).

ORMSEY, a W. county of Nevada, separated from California on the west by Lake Tahoe; area, 172 sq. m.; pop. in 1870, 3,668, of whom 769 were Chinese. It embraces a portion of the valley of Carson river, locally known as Eagle valley, containing many fine farms and gardens. In the E. part is the Nut Pine range, once covered with valuable wood; the W. part is crossed by one of the ridges of the Sierra Nevada, which is covered with pine. Silver, copper, and iron are found, but the mines have been little developed. Limestone and freestone are quarried. The chief productions in 1870 were 3,705 bushels of wheat, 1,245 of Indian corn, 2,270 of oats, 9,320 of barley, 22,947 of potatoes, and 901 tons of hay. The value of live stock was \$77,968. There were 2 planing mills, 4 saw mills, 6 quartz mills, a brewery, and a soap and candle factory. Capital, Carson City, which is also the capital of the state.

ORMUZ, or **Hormuz**, an island of Persia, on the N. side of the strait of the same name, leading from the Arabian sea to the Persian gulf, about 5 m. from the coast; lat. $27^{\circ} 5'$ N., lon. $56^{\circ} 29'$ E.; area, about 15 sq. m.; pop. about 300. It is nearly circular, and the surface is almost equally divided between hill and plain. The S. and S. W. sides present a mass of hills from 300 to 400 ft. high, of remarkable geological character, consisting chiefly of rock salt worn into fantastic outlines and honeycombed by the rains, incrustated with bright-colored earths, and destitute of vegeta-

tion. On the N. and E. sides of the island the shores form a low plain, which projects on the north in a sharp point. On the end of this are the remains of the once important Portuguese fortress, a quadrilateral bastioned fort, 750 ft. long by 620 ft. broad, separated



Old Portuguese Fort, Ormuz.

from the mainland by a moat now filled with sand. S. of it are the ruins of the Arab city of Ormuz, consisting chiefly of mounds strewn with pottery, many water cisterns, and a minaret 70 ft. high. On the S. E. end of the island are the remains of one of the palaces of the old kings. The village near the site of the city is only a collection of mat huts, whose inhabitants export salt, salt fish, and a kind of red earth used in Calcutta for staining and seasoning wood. A few soldiers hold the fort as a military post for the governor of Bunder Abbas. (See OMAN.)—Ormuz is probably the Ogyris of Strabo and the Organa of Arrian and Ptolemy. At a later period it was called Jerun. In the beginning of the 14th century Ayaz, king of old Ormuz, a town on the mainland which was known to the ancients as Harmozia, suffering from the incursions of the Tartars, removed to the island and built there a new Ormuz, which eventually became the capital of a kingdom comprising a considerable part of Arabia and of Persia. In the 15th century it had acquired great prosperity, and was the entrepot of the commerce between India and Persia and of the trade of Samarcand and Bokhara. At the beginning of the 16th century its reputed wealth and splendor attracted the cupidity of the Portuguese, and in 1507 Albuquerque sailed against it, but found the city defended by 30,000 men. In 1515 he returned with 27 ships, reduced it, and built the fortress. In 1543 the island paid to Portugal an annual tribute of 100,000 ducats. Its commerce soon began to decline, the Portuguese allowing no ships to navigate those waters except under oppressive conditions; but

it retained sufficient importance in the beginning of the 17th century to arouse the jealousy of Shah Abbas of Persia, who, aided by the ships of the English East India company, captured the fortress in April, 1622, although it was defended by 300 guns and 2,500 men. The city was destroyed by the shah, who wished to transfer its trade to his new port Bunder Abbas, and a great part of its building material was transported thither. At a later period the sultan of Oman took possession of it. In 1854 the Omanite officials were expelled by the shah, but in 1856 they were allowed by treaty to occupy it for 20 years on payment of an annual tribute.

ORMUZD, or **Ahura Mazda**, the supreme deity of the ancient Persians. He is the god of the firmament, the representative of goodness and truth, and the creator of the universe and of the beneficent spirits who have charge of the well being of man and all created things. According to Zoroaster, an incomprehensible being named Zeruane Akerene (or Zrvan Akarana, time without bounds), existed from all eternity; from him emanated primeval light, and from the latter sprang Ormuzd and Ahriman. Ahriman became jealous of his elder brother, and was condemned by the eternal one to pass 3,000 years in a region of utter darkness. On his release he created a number of bad spirits to oppose the spirits created by Ormuzd; and when the latter made an egg containing good genii, Ahriman produced another full of evil demons, and broke the two together, so that good and evil became mixed in the new creation. The two great opposing principles are called the king of light and the prince of darkness. Ormuzd is described as "sitting on the throne of the good and the perfect in regions of pure light," or as a venerable man seated on a bull, the emblem of creation. A later doctrine, still professed by the Guebres and Parsees, reduces Ormuzd from a great creator to a mere demiurge, or organizer of a universe previously created. (See **ZEND-AVESTA**.)

ORNE, a N. W. department of France, in Normandy, bordering on Calvados, Eure, Eure-et-Loir, Sarthe, Mayenne, and La Manche; area, 2,354 sq. m.; pop. in 1872, 398,250. The chief rivers are the Orne, Eure, Sarthe, and Mayenne; there are many ponds and marshes. The soil is generally sandy. Iron, plumbago, and granite are produced. Hemp, fruit, cattle, and poultry are raised, and needles, linens, cottons, and lace are manufactured. It is divided into the arrondissements of Alençon, Argentan, Domfront, and Mortagne. Capital, Alençon.

ORNITHICNITES. See **FOSSIL FOOTPRINTS**.

ORNITHOLOGY (Gr. *ὄρνις*, bird, and *λόγος*, discourse), the department of zoölogy which treats of the structure, habits, and classification of birds, the second class of vertebrated animals. For their structure see **BIRDS**. Until after 1825 most ornithologists classified birds according to the characters of the bill and feet; since then several authors, especially Oken, Nitzsch,

Sundevall, Müller, Cabanis, Bonaparte, and Burmeister, have drawn attention to the care they take of their young, the song and the vocal muscles, the number and length of the quills, the scales and feathers on the legs, the number of tail feathers, the position of the hind toe, and the absence, presence, and extent of the webs, as data for a natural classification. —Aristotle, in the third chapter of his eighth book on animals, mentions the modes in which birds subsist, that some are carnivorous, others granivorous, and others omnivorous; that some are terrestrial and others aquatic, and many migratory during winter; he enumerates the names of the species then known, without descriptions except for the eagles. —Belon, the reviver of natural history, in his *Histoire naturelle des oiseaux* (fol., Paris, 1555), classed birds by their habits and the places where they are found, making the four divisions of birds of prey, waders, swimmers, and birds which nestle in trees or on the ground; his work is illustrated with numerous woodcuts. Aldrovandus, in his *Ornithologia* (Bologna, 1599–1606), follows Belon in classifying birds according to their places of habitation and the nature of their food, but adds a great number of new descriptions. The work of Willughby, *Ornithologia libri tres* (London, 1676), was the first systematic attempt at classifying birds; in this the land birds are divided into two groups, one having curved beak and talons, the other with the bill and claws more nearly straight; the water birds are also subdivided into waders and swimmers. Ray, in the *Synopsis Methodica Avium* (8vo), published in 1713 after his death, made some improvements upon Willughby's system; and these two furnished the basis of the classification adopted by Linnæus. —In the 12th edition of the *Systema Naturæ* (1766), Linnæus divided the class into six orders: I. *Accipitres* or birds of prey, with the bill bent, and the upper mandible dilated on each side or armed with a tooth; legs short and robust, toes warty, and claws curved and sharp. II. *Picæ*, with bill convex or rounded above and edged on the lower part; legs short and robust, but with smooth toes. III. *Anseres* (swimmers), with bill smooth, covered with an epidermis, and thickened at its point; feet with palmated toes. IV. *Grallæ*, with bill almost cylindrical, thighs half naked, and legs formed for wading. V. *Gallinæ*, with bill convex, and the upper mandible arched over the under; feet formed for walking, and the toes rough below. VI. *Passeres*, with bill conical and pointed, legs formed for hopping, and toes slender and divided. In ornithology Linnæus deserves the same credit as in the other departments of zoölogy, for his excellent determination of genera and his admirable system of binomial nomenclature. —Brisson, in his *Ornithologia* (4to, Paris, 1760), describes about 1,300 species of birds, arranged in 26 orders and 115 genera, whose characters are drawn from the toes and their membranes, the

bill, and feathers of the legs; the descriptions are minute and accurate, and illustrated by numerous copperplate engravings.—Latham, in his "General Synopsis of Birds" and "Supplements" (1781–1801), in his *Index Ornithologicus* (1790), and in his "History" (10 vols. 4to, Winchester, 1821–'4), was the next writer of importance on general ornithology. In the last work he divides land birds into orders: I., rapacious or accipitrine, with 4 genera and 363 species; II., pies (like the shrikes, crows, parrots, cuckoos, woodpeckers, and kingfishers), with 32 genera and 1,320 species; III., passerine (finches, swallows, thrushes, and flycatchers), with 17 genera and 1,444 species; IV., columbine or pigeons, with a single genus and 136 species; V., gallinaceous (turkeys, pheasants, grouse, bustards), with 12 genera and 210 species; VI., struthious (dodo, emu, and ostrich), with 4 genera and 8 species. He divides the water birds into orders: VII., waders, with cloven feet (herons, snipe, sandpiper), with 20 genera and 455 species; VIII., with pennated feet (coots and grebes), with 4 genera and 29 species; and IX., web-footed (flamingo, albatross, gull, duck, penguin), with 17 genera and 359 species. He thus makes in all 111 genera and 4,324 species, of which many are ill determined and improperly made.—Lacépède in 1799 (*Histoire naturelle*) divided birds into two subclasses. Subclass I. (having the legs feathered, and no toes completely united by wide membranes) contains divisions: 1, with two toes in front and two behind, large and strong, the climbers (*grimpeurs*), with 6 orders and 12 genera; and 2, having three toes in front and one or none behind, with the 1st subdivision of birds of prey, with strong and curved claws, embracing a single order and 10 genera; 2d subdivision, having the external toes free or united only along the 1st phalanx (*passereaux*), with 8 orders and 36 genera; 3d subdivision, having the external toes united for almost the whole length (*platypodes*), like the hornbill, kingfisher, and bee-eater, with 5 orders and 7 genera; 4th subdivision, having the anterior toes united at the base by membrane (*gallinacés*), with a single order and 12 genera. Subclass II. (the legs without feathers, or with many toes united by a wide membrane) contains division 1, with three toes in front and one or none behind, with 1st subdivision, having the anterior toes united by membrane (water birds, ducks, &c.), embracing 6 orders and 17 genera; 2d subdivision, with all four toes united by a wide membrane (*oiseaux d'eau latirèmes*), like the cormorant and pelican, having 3 orders and 6 genera; and 3d subdivision, having the toes united at base by membrane (shore birds), with 7 orders and 26 genera; and division 2, with two, three, or four very strong toes, not united at base by membrane (*cursores*), like ostrich and dodo, with 2 orders and 4 genera: in all, 89 orders and 130 genera. Meyer and Wolff (*Almanach des oiseaux de l'Allemagne*), in 1810, made the 11 orders of ra-

paces, *coraces*, *pici*, *alcyones*, *osceines*, *chelidones*, *columba*, *gallina*, *cursores*, *grallæ*, and *natatores*; this seems to be the first work in which the terms *osceines*, *alcyones*, and *chelidones* are applied to the orders of birds. Illiger (*Prodromus Systematis Mammalium et Avium*, 1811) gives the 7 orders *scansores*, *ambulatores* (including the 2d, 4th, 5th, and 6th orders of Meyer), *raptatores*, *rasores* (including gallinaceous birds and pigeons), *cursores* (ostrich, bustard, plover), *grallatores*, and *natatores*, with 41 families and 147 genera.—Cuvier (*Règne animal*, 1817) preserved the 6 orders of Linnæus, founded on the characters of the beak and feet, except that he substituted the previously used term of *scansores* for those of the *pici* which have two toes before and two behind, placing the remainder among the *passeres*. His orders are: I., *accipitres*, divided into diurnal (hawks, &c.) and nocturnal (owls); II., *passeres*, divided into tribes *dentirostres* (like shrikes), *fissirostres* (swallows and goatsuckers), *conirostres* (crows, buntings, and starlings), *tenuirostres* (humming birds), and *syndactyli* (kingfishers); III., *scansores* or climbers (woodpeckers and parrots); IV., *gallinæ*, or birds resembling the domestic cock; V., *grallæ* or waders, divided into *brevipennes* (ostrich), *pressirostres* (bustards), *cultirostres* (cranes), *longirostres* (ibis, curlew, snipe), and *macro-dactyli* (rail, jacana); VI., *palmipedes*, divided into *brachypteri* (penguins and grebes), *longipennes* (terns and petrels), *totipalmes* (pelicans), and *lamellirostres* (ducks).—Vieillot in 1817, and in the article *Ornithologie* of the *Nouveau dictionnaire d'histoire naturelle*, made 5 orders: I., *accipitres*, diurnal and nocturnal, with 4 families; II., *sylicolæ*, with 2 tribes, *zygodactyli* and *anisodactyli*, equivalent to the climbing and passerine birds of other authors, with 30 families; III., *gallinæ*, with families *nudipedes* and *plumipedes*; IV., *grallatores*, with the tribes *di-tridactyli* and *tetradactyli*, with 15 families; and V., *natatores*, with the tribes *teleopodes*, *ateleopodes*, and *ptilopteri*, with 7 families.—Temminck (*Manuel d'ornithologie*, 2d ed., Paris, 1820–'40) modified the systems of Meyer, Illiger, and Latham, and made 16 orders, comprising 202 genera. His orders are: I., *rapaces* or birds of prey; II., *omnivores* (crows, rollers, starlings); III., *insectivores* (thrushes, shrikes, flycatchers, warblers); IV., *granivores* (larks, bunting, finches); V., *zygodactyli* (cuckoos, toucans, parrots, woodpeckers); VI., *anisodactyli* (creepers and humming birds); VII., *alcyones* (bee-eaters and kingfishers); VIII., *chelidones* (swallows and goatsuckers); IX., *columbæ* or pigeons; X., *gallinæ*; XI., *alektorides* (agami); XII., *cursores* (ostrich and bustard); XIII., *grallatores* or waders; XIV., *pinnatipedes* (coots and grebes); XV., *palmipedes*, swimmers; XVI., *inertes* (apteryx and dodo). This is followed by Naumann in his *Vögel Deutschlands* (13 vols. 8vo, Leipsic, 1822–'52), and is adopted in Stark's "Elements of Natural History" (Ed-

inburgh, 1828).—De Blainville (1822) called birds *pennifera*, and made the 9 orders of *prehensores* (parrots), *raptatores*, *scansores*, *salta- tores* (passeres), *sponsores* (pigeons), *gradatores* (*gallinæ*), *cursores*, *grallatores*, and *natatores*. Besides this system, founded on the charac- ters of the legs and feet, he proposed another, developed by L'Herminier in 1827, based on the anatomical peculiarities of the sternum or breast bone. (See *Annales de la société lin- néenne de Paris*, vol. vi.) He makes two sub- classes: I., normal birds, in which the sternum is provided with a crest, and with the three bones in the shoulder distinct and simply in contact, including 34 families of ordinary birds, from the hawks to the penguins; II., abnormal birds, in which the sternum is formed of two pieces, originally separated, united on the median line into a single plate, of various forms, but always without bony crest or keel; the shoulder bones, distinct in the young, are consolidated in the adult; this includes the single family of *curso- res* (ostriches). Lesson (*Manuel d'ornithologie*, Paris, 1828), though in his text he adopts the system of Cuvier, gives another in his intro- duction, as follows: Section I., terrestrial birds, with the orders: 1, *insessores*; 2, *passerini*; 3, *rapaces*; 4, *rasores*; and 5, *heterosoma* (ostrich- es). Section II., aquatic birds, with the orders: 6, *grallatores*; 7, *pinnatipedes*; 8, *natatores*; and 9, *paradoxaux* (including the genus *ornitho- rhynchus*, now universally recognized as a mam- mal). Gray ("Genera of Birds," 3 vols. 4to, London, 1837-'49) makes the system of Cuvier the basis of his classification, but separates the *columbæ* as an order from the *gallinæ*, and the *struthiones* from the *grallæ*, forming 8 orders with 49 families.—The famous quinary system of classification was for many years in vogue in England, and exerted considerable influence upon ornithology by calling attention to many affinities and analogies previously overlooked. Macleay, its founder (*Horæ Entomologicæ*, Lon- don, 1819-'21), assumes that all animals of a group must be analogous to those of every other group, besides forming a circle in themselves; and he therefore arrays them in circles and groups so as to bring out external analogies, without much regard to structural affinity. Vigors ("Transactions of the Linnæan Society of London," vol. xiv., 1825), following out his quineuncial and circular arrangement of affini- ties, adopts the five orders of *raptores*, *inses- sores*, *rasores*, *grallatores*, and *natatores*, char-

acterized respectively by their feet adapted for tearing, perching, scratching, wading, and swimming. These five groups, which he ar- ranges as circles, are connected as follows: the *raptores* to the *insessores* by the owls of the former and the goatsuckers of the latter, the immediate passage being made by the Austr- alian genus *podargus* (Cuv.); the pigeons are intermediate between the perching and galli- naeous birds, but belong essentially to the lat- ter, and these orders come nearest together at the insessorial plantain-eaters and the rasorial curassows; the passage from the gallinaeous birds to the waders seems to be between the bustards of the former and the genera *edicne- mus* (Cuv.) and *psophia* (Linn.) of the latter; the passage from the waders to the swimmers is by the coot (*fulica*, Linn.) of the former and the Australian goose (*cereopsis*, Lath.) of the latter; the swimmers are brought back to the *raptores* by the frigate bird (*tachypetes*, Vieill.) of the former, and probably some of the *gyp- ogeranidæ* of the latter. The affinities are thus represented (*op. cit.*, p. 509):



Each of these five tribes in each of the five orders is capable of being subdivided into five families, which may be arranged in circles similarly connected. Swainson (Lardner's "Cabi- net Cyclopædia," vol. xiii., 1837) adopts the same five orders and the general quinary ar- rangement, and expresses the analogies exist- ing between birds and mammals in the follow- ing tabular form:

1. Typical.	<i>Insessores.</i>	Prehensile.	<i>Quadrumana.</i>
2. Subtypical.	<i>Raptores.</i>	Carnivorous; retractile claws.	<i>Fera.</i>
3. Aquatic.	<i>Natatores.</i>	Feeding and living in the water.	<i>Cetacea.</i>
4. Suctorial.	<i>Grallatores.</i>	Jaws much prolonged.	<i>Glires.</i>
5. Rasorial.	<i>Rasores.</i>	Domestic; feet for walking.	<i>Ungulata.</i>

He connects the 1st and 2d, 3d and 4th, and 4th and 5th orders by the same tribes as does Vigors; but he is inclined to connect the 2d with the 3d by the *dididæ* (dodo), which he places erroneously near the vultures, instead of the *gypogeranidæ*, which he considers either

the grallatorial or possibly the rasorial type of the *raptores*; he connects the 5th with the 1st by the *megapodidæ* instead of the curassows. According to the principle of these systems, birds are connected on the one hand with rep- tiles through the pterodactyl, and on the oth-

er with mammals through the ornithorhynchus and the ostrich. Though these affinities cannot be made the basis of a natural classification, they are interesting, ingenious, and to some extent philosophical.—Oken, in various works from 1809 to 1843, published his system of classification, in which birds are called ear animals, in the division according to the senses, because in them for the first time the external auditory meatus as well as the cochlea is exhibited in perfection; birds are also nerve animals, in the anatomical division, as they have a complete nervous system with cerebrum and cerebellum. They belong to his 2d province, of *sarcozoa*, 4th circle or flesh animals, and 12th class or *otozoa* or *neurozoa*. They are the first encephalic animals, as the brain defines the head, which is here for the first time freed from the trunk and placed upon a long neck far removed from the thorax, hence also called cervical animals; the caudal vertebræ, on the contrary, are fewer than in other classes. Birds are capable of instruction, affection, imitation, gratitude, and other mental manifestations not seen in reptiles and fishes. They are the closest repetition of insects, the thorax predominating over the rest of the body, with large respiratory muscles; their lungs are a cluster of insect tracheæ, full of foramina through which air penetrates all over the body, as in insects; the intestine lies in the air, and the bird to a certain extent breathes from it; the whole bird is lung, and its body a thoracic cavity, as the latter is a sexual cavity in the fish and an abdominal cavity in the reptile; the food is crushed in a muscular stomach, as in insects; a bird is an insect with fleshy limbs, and a feather is an insect's wing. With the bird, for the first time, the voice proper breaks forth; "the bird speaketh the language of nature." In Oken's "Physiophilosophy" (Ray society edition, London, 1847) are given two great divisions of birds, according as the young require to be fed by the parents or not, the former being the lowest; this principle of division, first published in 1821, has retained its place in ornithological science, and lies at the base of the systems now generally followed in Europe and in this country.—Carus (1828), in his *Grundriss der vergleichenden Anatomie*, ranks birds in his 6th class or *cephalo-thoracozoa*, characterized by great development of the respiratory organs. He makes the orders: I., *natantes*, having relations with reptiles, especially such of its members as fly poorly or not at all (like the penguins); II., *vadentes* or waders; III., *prendentes*, with the suborders *rapaces*, *passeres*, *scansores*, and *gallinæ*; and IV., *incedentes* or struthious birds, having relations to mammals. Ehrenberg (1836) ranks birds as the second and last class of the *nutrientia* or animals which take care of their young; this division is not strictly natural, as some reptiles and fishes have a care for their progeny.—The eggs of birds have generally been selected for investigations of embryology. The unity of anatom-

ical structure in all vertebrates is confirmed by the common structure of the primitive egg, and the order of classification from anatomical evidence by the metamorphoses which each class undergoes to its full development. The bird goes through its fish-like and reptilian structure and form; the only difference between the egg of a bird and a mammalian ovum, as to external covering, is that the former has a hard shell when laid protecting the immature chick, while in the latter the envelopes remain membranous, having a peculiar connection with the maternal body which is not severed until the birth of the young. Von Baer (1828) places birds in his double symmetrical type, whose embryos acquire an allantois, but have no umbilical cord, having wings and air sacs. Van Beneden (1855) ranks birds as the second class of his *hypocotyledones* or hypovitelians, in which the vitellus enters the body from the ventral side. Prof. Agassiz ("Lecture on Embryology," Boston, 1849) gives the results of some observations on the structure of the bird embryo, from which it appears that the limbs are not at first developed in the form which is to be permanent; the legs and wings are formed as fins; in all the orders of birds, with their various powers of locomotion, the legs and wings are uniformly webbed like the fins of fishes; in the same manner the primary condition of the heart, lungs, and other organs of a bird is that of these organs in a fish. This would indicate that the web-footed birds are lower in the scale than those with divided toes; and that the union of all the former into one group, however different the structure of their wings, plumage, and internal organs, and their mode of life—the almost wingless penguin with the swift-flying ocean birds, the hook-beaked predaceous gulls with the flat-billed and timorous ducks—must be an unnatural arrangement. The examination of the feet of an embryo robin, swallow, warbler, and finch, showed all four toes directed forward and webbed, while in the mature birds they are separate, three directed forward and one backward; he found the bill of the immature robin resembling that of a vulturine bird, indicating the comparatively low type of the latter; indeed some water birds, like *lestris* (skua gull), have a bill very greatly resembling that of the vultures; some birds of prey also resemble water birds in the rudiment of a web between the toes. He regards birds which have all their toes directed forward as of a lower type than those in which one is directed backward, as, for instance, the pelicans and cormorants among water birds, and the swifts (genus *cypselus*, Ill.) among swallows; a similar idea was broached by Sundevall in 1835. In Prof. Agassiz's classification ("Contributions to the Natural History of the United States," vol. i., Boston, 1857), birds form the seventh class of vertebrates, with four orders, *natatores*, *grallæ*, *rasores*, and *insessores* (including *scansores* and *accipitres*).—The principle of classification of

birds according as the young are or are not fed by the parents, proposed by Oken, was adopted by Sundevall (*Konglik Vetenskaps-Academiens Handlingar*, Stockholm, for years 1835 and 1843), who also used the position of the hind toe and the powers of song in his classification. His sections are: A. *Aves altrices*, which nourish their young in the nest, having either the thumb or the external toe turned back and entirely resting on the ground. These comprise the divisions or legions: I. *Volucres (passeres* of Cuvier), typical flying birds, with the thumb only turned back, containing the *passeres* and *oscines* (singers). II. *Gressores* or walkers, containing the swallows and humming birds, woodpeckers, parrots, cuckoos, kingfishers, owls, hawks, guans, and pigeons. B. *Aves præcoces*, whose young seek their own food soon after birth, having the thumb elevated or absent. III. *Cursores*, runners, the pheasants and grouse, the ostrich family, bustards, herons, storks, rails, and sandpipers. IV. *Natatores* or swimmers, with the femur and base of tibia included under skin of abdomen, including the gulls and petrels, pelicans and gannets, ducks, loons, guillemots, and penguins. Keyserling and Blasius (*Wirbelthiere Europas*, Brunswick, 1840) make the six orders *rapaces*, *scansores*, *oscines*, *gallinaceæ*, *grallatores*, and *natatores*.—Though Cuvier long before had drawn attention to the peculiar muscular apparatus of the larynx in true singing birds, and to its inferior development or absence in others, J. Müller (Berlin "Transactions," 1845) first laid stress on its importance as an element in classification; and on this and on corresponding external characters, Cabanis, and after him Burmeister (*Thiere Brasiliens*, Vogel, Berlin, 1856), divided the *insessores* into *strisores*, *clamatores*, and *oscines*. According to Cabanis, the fusion of all the scutellæ of the tarsus into a continuous envelope or "boot," without indication of divisions, is the type of the highest bird, and the position of the families and genera in the scale is high according to their approach to it and to the reduction in size of the first quill. Cabanis (*Archiv für Naturgeschichte*, Berlin, 1847) makes the ten orders of *oscines*, *clamatores* (crying birds, like shrikes, rollers, and kingfishers), *strisores* (having no power of modulating the voice, like swallows and goatsuckers), *scansores*, *columbæ*, *raptatores*, *rasores*, *cursores*, *grallatores*, *natatores*; the first four orders compose a subclass named *insessores* by Bonaparte in his catalogue of 1842. Prince C. L. Bonaparte (*Comptes rendus*, Oct. 31, 1853) constructed a table in which the two great subclasses, *altrices* and *præcoces*, are made with reference to whether the young require to be fed by the parents. Van der Hoeven ("Handbook of Zoölogy," English translation, 1857) makes the following six orders: *natatores*, *grallatores*, *gallinæ*, *scansores* or *zygodactyli*, *passerini* (*ambulatorios* of Illiger and *anisodactyli* of Vieillot), and *raptatores*. Prof. S.

F. Baird ("Pacific Railroad Survey," vol. ix., Washington, 1858) adopts a classification chiefly from Keyserling and Blasius, Cabanis, Bonaparte, and Burmeister. Prof. Richard Owen ("Anatomy of Vertebrates," vols. i. and ii., London, 1866) retains with slight modification the orders as adopted by Gray, with the exception of *columbæ*, which he reunites with *rasores*, and *passeres*, which he separates into two distinct orders, the *volitores* (swifts, goatsuckers, bee-eaters, humming birds, kingfishers) and *cantores* (flycatchers, warblers, thrushes, finches, crows, swallows, creepers). The *raptores*, *scansores*, *volitores*, and *cantores* constitute his first section, the *altrices*, while the remaining orders, *rasores*, *cursores*, *grallatores*, and *natatores*, are included in the second section, the *præcoces*. A third section, the *uroioni*, is added, of which the extinct *archæopteryx* forms the type. The classification of Prof. Huxley, as put forth in his "Classification of Animals" (London, 1869) and "Anatomy of Vertebrated Animals" (1871), departs widely from any of the foregoing, and will probably meet with but little favor among present ornithologists. It is founded mainly upon the characters of the sternum (as in the classification of De Blainville) and vomer, circumstances which scarcely appear of sufficient significance to serve as a basis in a natural classification. Huxley divides birds into three primary groups, the *saururæ*, *ratitæ*, and *carinata*, the first of which corresponds with the *uroioni* of Owen. The *ratitæ* and *carinata* are respectively characterized by the absence and presence of a keel, the former comprising the kiwis, moas, cassowaries, and ostriches. The *carinata* are further subdivided into four secondary groups, founded upon the relative position and structure of the bones entering into the formation of the palate, which are in turn resolved into 20 alliances, to each of which the termination *morphæ* is appended; e. g., *geranomorphæ*, the cranes, and *coracomorphæ*, the passerines. The arrangement is as follows: I., *dromæognathæ*, with one alliance (the tinamous); II., *schizognathæ*, with nine alliances (the plovers, gulls, penguins, cranes, hemipods, fowls, sand grouse, pigeons, and hoazins); III., *ægithognathæ*, with three alliances, the passerines, swifts, and woodpeckers; IV., *desmognathæ*, with seven alliances (birds of prey, parrots, *coccygomorphæ*, including the cuckoos, kingfishers, and trogons, the anserine birds, flamingoes, storks, and cormorants).—No department of zoölogy has been so extensively and elegantly illustrated as that of ornithology; reference may be made to the figures in the works of Sloane, Catesby, Seba, Edwards, Albinus, Brisson, Sepp, Browne, Latham, Pennant, Hardwicke, Bewick, Donovan, Lewin, Shaw, Jardine and Selby, Buffon, Desmarest, Le Vaillant, Temminck, Spix, Vieillot, Rüppel, Audebert, Horsfield, Lesson, Swainson, Gray, Gould; and in America to those of Wilson, Bonaparte, Audubon, De Kay, Cassin, Baird, and Brewer; to the "Proceedings of

the Zoölogical Society" of London (descriptions of Mr. Sclater and others), and the various illustrated works, the results of the national expeditions sent out by England, France, the United States, Russia, Holland, &c. Among the magnificent works may be mentioned the 1,008 *planches enluminées* of Buffon (fol., Paris, 1770-'86); the 600 *planches coloriées* of Temminck; Le Vaillant's birds of Africa, parrots, birds of paradise and rollers, promerops, and rare birds of America and India, in all about 570 plates; Edwards's 362 plates of uncommon birds; Vieillot and Audebert's nearly 180 plates of birds of brilliant plumage; Gould's series of the birds of Australia and Europe, the humming birds, trogons, &c.; and Audubon's 435 plates in folio of North American birds.—America has not produced any original system of classification of birds; but the writings of Nuttall, Wilson, Bonaparte, Audubon, De Kay, Baird, Coues, Allen, Brewer, Lawrence, and Cassin have well illustrated the ornithology of this country; many new and beautiful species have been added since 1840; and Messrs. Baird, Brewer, and Ridgway are now (1875) publishing a new work on North American birds.—There are probably 6,000 species of birds, of which about five sixths are known. Birds existed on the earth before the present geological epoch, but their remains in a fossil condition are comparatively rare. The oldest date claimed for birds is the new red sandstone epoch, where in the Connecticut valley Dr. Hitchcock and others have found tracks which they pronounce those of birds; but many suppose them to have been made by reptiles, and for various reasons it is doubtful if any birds existed at that epoch. Birds with reptilian characters certainly did appear in the upper oölite (see *ΑΡΧΗΛΟΡΤΕΥΧ*); birds of prey have been found in the tertiary and diluvial; *passeres* in the same; *gallina*, rare in the tertiary, are abundant in the diluvium; among *cursor*es, the genus *rhea* has been found in the caverns of Brazil, and the *dinornis*, *epyornis*, &c., have been met with in alluvial deposits; the *palmipedes* are still earlier, and the genus *cimoliornis* (Owen), coming near the albatross, has been found in the chalk of Europe.

ORNITHORHYNCHUS (Gr. *ὄρνις*, a bird, and *ῥίγχος*, a beak), a genus of implacental mammals of the order *monotremata*, which seem to form a connecting link between mammals and birds, and in some respects having affinities even with reptiles. A single species only is described, the *platypus anatinus* (Shaw), or *ornithorhynchus paradoxus* (Blumenb.), the duck-billed platypus of English writers, the water mole of the colonists, and the *mallangong* of the natives; it inhabits the fresh-water streams of Australia and Papua. It is from 18 to 22 in. from the end of the jaws to the point of the tail, the latter being about 5 in.; the color above varies from ruddy to dark brown, and is whitish below; the jaws are enclosed in a horny sheath, very sensitive, like the bill of

a duck, and have two horny teeth on each side above and below, flat, rootless, composed of perpendicular horny tubes; the snout is flat and broad, the lower jaw the narrower and shorter and provided with lamellæ on the sides; the eyes small and brilliant; ears not



Ornithorhynchus paradoxus.

apparent externally, with an aperture which can be opened or shut at will; the tongue consists of two parts, the posterior broad, flat, with soft papillæ and a free process bearing two pointed horny teeth, the anterior narrow and covered with upright points longest and sharpest toward the tip; the nostrils are at the end of the upper mandible; cheek pouches are present, and a bulb on the back of the tongue prevents the contents of the mouth from passing into the larynx; the fur is soft and thick, like that of the otter. The legs are short, and the feet five-toed, webbed, and furnished with strong claws; the fore feet are the strongest, and their loose webs extend beyond the claws; the hind legs are armed with a sharp, conical, bony spur, with a corneous investment, perforated for the passage of a duct communicating with a gland situated on the thigh; the tail is flat, broad, and beset with rigid hairs. As the name of the order imports, the alimentary, urinary, and reproductive organs open into a common cloaca, as in birds; mammary glands are present, secreting milk for the nourishment of the young, which are born blind and naked; there are no prominent nipples, and the mammary openings are contained in slits in the integument; the beak in the young is short and flexible, adapted for sucking; M. Verreaux (*Revue zoologique*, 1848) says the young, when they are able to swim, suck in the milk from the surface of the water into which it is emitted. The shoulder bones are unlike those of other mammals, and are intermediate in arrangement between those of birds and reptiles; in many points of the generative system, also, there are ornithic and rep-

tilian affinities. It burrows in the banks of streams, where it passes the day in sleep rolled up like a ball, coming out at dusk and during the night in search of food; it is an excellent swimmer and diver, and feeds upon worms, insects, and small aquatic animals, in the manner of a duck; it walks very well, and climbs trees with facility; the burrows, which have an opening below the water, are sometimes 20 or 30 ft. long, extending upward beyond the reach of inundations; in the highest and driest part is an enlarged cavity for the nest of themselves and young. It can remain under water only about seven or eight minutes at a time; it is cleanly in habit, and fond of warmth and dryness. The young in confinement are playful, and will eat rice and egg, soaked bread, and finely chopped meat; they are rather delicate, and die very soon from want of food. They do not lay eggs, but are true mammals; the fluid secreted by the femoral gland is not poisonous. Skins of this animal are not uncommon, but its skeleton is rare.

ORNITHOSAURIANS, extinct flying reptiles of the mesozoic age. (See *PRERODACTYL*.)

ORONSAY. See *COLONSAY*.

ORONTES, a river of Syria, which rises not far from Baalbek in Cœle-Syria, flows N. between the Lebanon and Anti-Lebanon, and through the plains of northern Syria, passing Homs (ancient Emesa) and Hamah (Hamath or Epiphania), and then turning W. into the valley of Antioch, falls into the Mediterranean near lat. 36° N. It is about 250 m. long, and remarkably picturesque between Antioch and the sea. Its Arab name is Nahr el-Aasy.

OROOMIAH. See *URUMIAH*.

OROSIUS, Paulus, a Spanish theologian, born in Tarragona about the end of the 4th century, died probably in Africa. He went to Africa about A. D. 414 to consult St. Augustine on points of doctrine, became his associate in the monastic life, and wrote *Consultatio sive Com-mentorium Orosii ad Augustinum de Errore Priscillianistarum et Origenistarum*, to which Augustine replied in the treatise *Contra Priscillianistas et Origenistas Liber ad Orosium*. In 414 or 415 he set out for Palestine, to counteract the influence of Pelagius. He won the confidence of Jerome, who shortly after attacked the Pelagian doctrines. In 415 Orosius arraigned Pelagius for heresy before the tribunal of John, bishop of Jerusalem; but the accusation failed both here and in the appeal to the council of Diospolis. Orosius, being himself denounced by John as a blasphemer, wrote *Liber Apologeticus de Arbitrii Libertate*, in which he defended himself and attacked the doctrines of Pelagius. From Palestine he returned to Hippo, and in 416 went thence to Spain. By the advice of Augustine, he composed his *Historiarum adversus Paganos Libri VII*, extending from the creation of the world to the year 417, which, with the exception of the concluding portion, is destitute of historical value. The best edition is that of Havercamp

(4to, Leyden, 1738). Of the Anglo-Saxon translation of the work by King Alfred there are three editions with English versions, by Daines Barrington, Benjamin Thorpe, and Dr. Bosworth.

ORPHAT. See *ARAFAT*.

ORPHEUS, a mythical Greek personage, the chief of a circle of poets, embracing Linus, Musæus, Eumolpus, and others, to whom were attributed various hymns and poems inculcating religious conceptions different from those of Homer and Hesiod. An ante-Homeric antiquity was assigned to these apocryphal writings, and they were received by the Greeks as a sort of divine revelation. The name of Orpheus does not appear in Homer or Hesiod. He is mentioned by Ibycus in the 6th century B. C. as the "renowned Orpheus;" by Pindar as son of Cægrus, one of the Argonauts, and the father of songs; by Hellanicus as the ancestor of both Homer and Hesiod; by Æschylus as leading the trees after him to the sound of his lyre; by Eratosthenes as worshipping Apollo rather than Bacchus; by Euripides as related to the Muses, as charming by his song the rocks, trees, wild beasts, and infernal powers, as connected with the Bacchanalian orgies, as founder of the sacred mysteries, and as living amid the forests of Olympus; and by Aristophanes as one of the oldest poets and the teacher of religious initiations. Though Plato quotes from the Orphic writings, he evidently regarded them as spurious; but he seems not to have doubted the existence of Orpheus or the genuineness of his peculiar theogony. Aristotle held that Orpheus was altogether a fictitious personage. Later accounts make him a Thracian bard in the era of the Argonauts, to whom Apollo gave a lyre, in the use of which he was instructed by the Muses, and who on account of the miraculous charm of his song was engaged as one of the Argonauts. On their expedition the power of his lyre held back the moving Symplegadae, which threatened to crush the ship, lulled the Colchian dragon to sleep, and rendered other important services. On his return he applied himself to the civilization of the rude inhabitants of Thrace, was reputed to have visited Egypt, and according to the legends sought his deceased wife Eurydice in Hades, where the music of his lyre suspended the tortures of the damned, and won back his beloved on condition that he should not look round at her till she reached the upper world. He violated the condition, and saw her vanish. In his despair he treated the Thracian Mænads with contempt, who avenged themselves by tearing him to pieces in their orgies. According to another legend, he perished by the thunderbolts of Jupiter. The remnants of his body were gathered by the Muses, and buried at the foot of Olympus, where a nightingale sang above his tomb.—The earliest of the Orphic compositions are now usually ascribed to Onomacritus, who lived at the court of Hipparchus. About the same time the Orphici, or associa-

tions of the followers of Orpheus, transformed the Dionysiac worship, making it ascetic and mystical rather than orgiastic. This worship was further modified, and its influence on the Greek religion increased, by the union of Orphic and Pythagorean societies and doctrines. According to the Orphic cosmogony, which has an oriental pantheistic character, Cronos (time) was the first principle, from which proceeded Chaos and Æther. The former was an infinite and shapeless mass, which, in condensing under the influence of the latter, assumed an ovoid form, containing in its centre the cosmical germ. From this germ sprang the gold-winged Eros or Phanes, the first manifestation of intelligence or light, who in union with Nyx (night) created the heavens and earth. Ericapæos was the creative word which gave birth to the gods. The soul was brought to the surface from the depths of matter. Zeus had four predecessors, and among his progeny was Zagreus Dionysus. From the latter were expected a golden age, the liberation of souls, and a state of beatitude at the end of all things. The Orphic writings increased in honor during the declining centuries of paganism, and by both the Christian and pagan Neo-Platonists of the 3d and 4th centuries were believed to be the most ancient summary of the Greek faith. They then received a large accession of forgeries by Christian philosophers. The apocryphal productions included under the title of *Orphica* are: a poem on the Argonautic expedition, in 1,384 hexameters; a collection of hymns in hexameters, evidently of Neo-Platonic origin; *Lithika*, better than either of the preceding, and treating the properties of stones and their uses in divination; and fragments, chiefly of the theogony, containing the only remains of the early Orphic literature. The best edition is that of Hermann (Leipsic, 1805).

ORPINE. See SEDUM.

ORR, James Lawrence, an American statesman, born at Craytonville, S. C., May 12, 1822, died in St. Petersburg, May 5, 1873. He graduated at the university of Virginia in 1842, was admitted to the bar and practised in Anderson, S. C., and in 1844-'5 was a member of the legislature. From 1848 to 1859 he was a member of congress, and was speaker of the house of representatives in the 35th congress. He was a member of the South Carolina convention which voted for secession; was one of the state commissioners to Washington in December, 1860; and in 1862-'5 was a Confederate States senator. From 1865 to 1868 he was provisional governor of South Carolina under federal appointment, and afterward acted with the republican party. In 1870 he became judge of the state circuit court, and in 1873 was appointed United States minister to Russia, dying soon after his arrival.

ORRERY, a machine representing the motions of the planetary bodies. Distinct names have been given to various modifications of it: the planetarium, which exhibits the orbital paths

of the planets and their satellites; the tellurium, which shows the motions of the earth causing day and night, the seasons, and the variable length of the former as dependent upon the latter; the lunarium, which shows the motions of the moon; and the satellite machine, chiefly intended to represent the motions of Jupiter and his satellites. The ordinary orrery was invented by George Graham about 1715, and first patronized by the earl of Orrery.

ORRIS ROOT. See IRIS.

ORSAY, Alfred Guillaume Gabriel d', count, a man of fashion, born in Paris, Sept. 4, 1801, died there, Aug. 4, 1852. He was the son of a general, and early served in the French army. He became acquainted with the earl and countess of Blessington on his first visit to London about 1822 with his sister, the duchess de Gramont. In 1827 he married the earl's daughter by his first wife, but separated from her some time after her father's death in 1829. Almost from the beginning of the acquaintance he was a constant companion of Lady Blessington in her travels, and at Gore house in London. In 1849 they went to Paris, where she died June 4. In London he was an oracle in fashionable life. He was singularly handsome and brilliant, and excelled as a painter and sculptor. He was a friend of most of the eminent men of his day, including Louis Napoleon, who shortly before the count's death appointed him director of fine arts. Engravings of his "Gallery of Portraits" appeared in New York in 1875.—The countess d'Orsay, who married soon after his death the Hon. Charles Spencer Cowper, died Dec. 17, 1869.

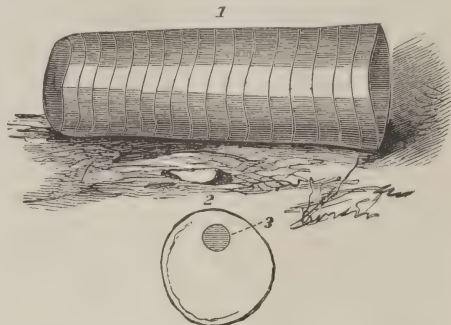
ORSINI, an Italian family, conspicuous in the middle ages. Their ancestors were distinguished at Rome as early as the first half of the 12th century. Giordano, for his services to the pope as a soldier, was made a cardinal in 1145, and in 1152, in the capacity of legate, was sent to Conrad III. of Germany; while his nephew, Matteo, held the post of prefect of Rome. Toward the end of the 12th century Orso ruled the city as its senator, while another member of the family, Celestine III., was pope. Another Matteo, styled the Great, was elected senator, at the same time holding large fiefs in the Campagna. One of Matteo's sons, Giovanni, became pope under the name of Nicholas III. in 1277, and endeavored to perpetuate the dignity of senator in his family, for whom he secured princely alliances. The Orsini now reached the zenith of their fortune, and their quarrels with the Colonnas filled the annals of Rome. They were Guelphs, and generally found on the side of the popes, while their rivals adhered to the Ghibelline party. The castle of Bracciano, on the lake of that name, was the chief residence of the family, who possessed besides many strongholds in Rome and its vicinity. The Orsini, with the Colonna and Savelli families, were the special objects of the enmity of Pope Alexander VI.—The Neapolitan branch of

the family is still extant. Some of its early members became counts of Nola and dukes of Gravina in the 15th century. Pietro Francesco gave up his duchy to his brother Domenico, entered the church, and in 1724 became pope under the name of Benedict XIII. The family still hold the highest rank among Italian nobles. Prince Domenico Orsini, duke of Gravina, born Nov. 23, 1790, died in Rome, April 18, 1874. He was a lieutenant general, and bore the honorary appellations of assistant prince of the holy see and senator of Rome. He married, Feb. 6, 1823, Maria Luisa, daughter of the celebrated banker Torlonia, duke of Bracciano, who bore him three daughters and one son, Filippo, present duke of Roccagorsa. The seat of the family is still at Rome, but their usual residence until the revolution of 1860 was at Naples in the Gravina palace.

ORSINI, Felice, an Italian revolutionist, born in Meldola, near Forlì, in 1819, executed in Paris, March 13, 1858. He early engaged with his father in political plots, and when scarcely 25 years of age was sentenced to penal labor for life. Restored to liberty in 1846, he participated in various revolutionary movements. After the suppression of the revolution of 1848-'9 he lived for some years in England, and was employed in several revolutionary missions by Mazzini. In 1854 he was arrested in Hermannstadt, Transylvania, and carried to the fortress of Mantua, whence he succeeded in escaping in 1856. Returning to England, he published "The Austrian Dungeons in Italy." In 1857 he went to Paris to assassinate Napoleon III., whom he considered the main obstacle to the progress of revolution. He had three associates named Pieri, Rudio, and Gomez. On the evening of Jan. 14, 1858, as the emperor and empress were approaching the Grand Opéra, three bombs were thrown under their carriage and exploded, killing or wounding a large number of persons, though the intended victims escaped. Orsini, Pieri, and Rudio were sentenced to death and Gomez to hard labor for life. Through the intercession of the empress Eugénie the life of Rudio was spared. Orsini died with perfect composure, having a few days before his execution exhorted Napoleon in a letter to liberate Italy. His autobiography, translated by G. Carbonel, was published at Edinburgh in 1857.

ORTHO CERAS (Gr. *ὀρθός*, straight, and *κέρας*, horn), a fossil tetrabranchiate cephalopod, confined to the palæozoic and early mesozoic periods, in which it played the part now taken by the carnivorous cuttle fish. Though the shell is chambered, with a perforating siphon, as in the living nautilus, it is generally straight; in some allied genera, as *lituites* and *cyrtoceras*, the shell is partially coiled, but never so completely as in the mesozoic ammonites. It is likely that the animal could not get entirely within the outer chamber, and that from the buoyancy of the shell it must have remained head downward. It attained a very large size, some being

more than 10 ft. long, and as large round as a man's body. None have been found in strata later than the triassic age. They are allied to the nautilus on the one hand and to ammonites on the other. It is interesting to observe that these Silurian straight tetrabranchi-



Orthoceras exploreri.

1. Side view of fragment, showing septa. 2. Transverse section of same, showing the siphuncle, 3.

ate cephalopods gradually gave place to forms more and more coiled, till the tightly coiled ammonites of the mesozoic age appeared; then, as the type retrograded from this culminating point, the whorls began to unroll again, and such forms as *ancyloceras*, *toxoceras*, *scaphites*, *hamites*, and *baculites* marked the extinction of the many-chambered cephalopods, whose principal present form is the nautilus.

ORTHOPTERA, an order of insects, with chewing jaws, two rather thick and opaque upper wings, slightly overlapping on the back, and two larger thin, plaited, straight wings under these; they undergo partial transformation, and the larvæ and pupæ, though wingless, are active. It contains the four groups of runners (earwigs and cockroaches), graspsers (*mantes* or soothsayers), walkers (spectres and walking leaves), and jumpers (crickets, grasshoppers, and locusts). The *mantes* are carnivorous, and the other groups are more or less destructive to vegetation and household articles. Some of the strangest insect forms occur in this order.

ORTOLAN, or *Ortulan*, a bunting of the genus *emberiza* (Linn.). The bill is small, acute, and conical, and the palate is furnished with a prominent bony knob; the wings are moderate, the tail lengthened and somewhat forked, with feathers rather lanceolate; tarsi as long as the middle toe. This well known bird (*E. hortulana*, Linn.) is about 6½ in. long; the head and neck are greenish gray with dusky spots; the throat, space around eye, and band from bill downward, yellow; upper parts reddish bay, each feather black in the middle; below bay red, tipped with gray; tail blackish; the female is smaller, with brown spots on the breast and fainter colors. Rare in England, it is very abundant in southern Europe, where great numbers are caught in snares in early autumn, and fattened for the table in constantly lighted

rooms on oats, millet, and spiced bread, on which the flesh becomes very fat and of a high and delicious flavor; they are considered perfect when they attain the weight of three ounces. Ortolans are numerous in Japan, and are very abundant on the island of Cyprus,



Ortolan (*Emberiza hortulana*).

where they are pickled in casks with spice and vinegar, each cask containing 300 or 400 birds; in some years the number of casks exported has amounted to 400. In ancient Rome epicures paid enormous prices for these delicacies, and they are still greatly relished; many are annually prepared for the tables of the rich. It is a handsome bird, and has a flute-like warble, but is chiefly prized for the table.

ORTON, James, an American naturalist, born at Seneca Falls, N. Y., April 21, 1830, died Sept. 24, 1877. He graduated at Williams college in 1855, studied theology at Andover, and, after travelling in Europe and the East, was ordained a Congregational minister in 1860. In 1866 he became instructor in the natural sciences in Rochester university, and in 1867 led an expedition from Williams college across South America, by Quito, the Napo, and the Amazon, discovering the first fossils found in the Amazon valley. In 1869 he became professor of natural history in Vassar college. In 1873 he made a journey from Pará up the Amazon to Lima and Lake Titicaca; and he died while crossing that lake after another journey through Peru. He published "The Miner's Guide and Metallurgist's Directory" (18mo, New York, 1849); "The Proverbialist and Poet" (8vo, Philadelphia, 1852); "The Andes and the Amazon" (8vo, New York, 1870); "Underground Treasures: how and where to find them" (12mo, Hartford, 1872); "The Liberal Education of Women" (12mo, New York, 1873); and "Comparative Zoölogy" (8vo, 1875).

ORTYGLIA. See DELOS, and SYRACUSE.

ORURO. I. A W. department of Bolivia, occupying a large proportion of the great plain

of its own name, sometimes also called the valley of the Desaguadero, bordering on Peru; area, 21,600 sq. m.; pop. about 112,000. It lies between the eastern and western cordilleras of the Andes, but no appearance of volcanic action is anywhere presented, and the department is never visited by earthquakes. The face of the country is generally undulating. It is drained by the river Desaguadero, which is the only outlet of Lake Titicaca, and flows into Lake Aullagas in this department, which has no visible issue. The silver mines of the Cerro de Oruro, of El Turco in the province of Carangas, and of Popó have long been celebrated for their abundant yield. Gold is also found. The tin mines of this department are among the richest in the world; and large quantities of rock salt have been exported from Carangas and Curahuara. On this great plateau, notwithstanding a mean elevation of 13,340 ft. above the sea, extremes of heat and cold are rare; but violent tempests are frequent during the wet season, from November to April. The chief agricultural products are potatoes and quinoa, a common substitute for them. Barley and wheat do not ripen here, but are cut for forage. In the more sheltered valleys fruits are plentiful, the vine thrives, and very good wine is made. Guanacos, alpacas, llamas, and vicuñas everywhere abound, and there are numerous cattle and sheep in Carangas. The department is divided into the provinces of Oruro, Popó or Poopó, Carangas, and Porco. II. A fortified city, the capital and only important town of the department, in a valley about 27 m. long, about 200 m. N. W. of Sucre. It has regular streets, but the houses, once among the finest in the republic, are now much dilapidated. The only public edifices of importance are nine churches, the town hall, and barracks. Agriculture, mining, and the manufacture of coarse woollens and cheese are the chief occupations. Oruro was founded in 1590, and called San Felipe de Austria. The seat of the executive government of Bolivia was transferred thither in 1869 from La Paz; and a railway to Tarapacá in Peru was contracted for in 1872.

ORVET. See BLINDWORM.

ORVIETO, a town of Italy, in the province of Perugia, on the right bank of the Paglia, at the confluence of the Chiana, 60 m. N. N. W. of Rome; pop. about 8,000; of the commune, about 15,000. It has been the seat of a bishop since 509. It has a magnificent Gothic cathedral of white and black marble, dating from the 14th century and filled with remarkable works of art; several palaces, one of which is also rich in works of art; and deserted convents and ruined churches. The town is on a high steep hill, and is well built and clean and surrounded by a wall. Orvieto is celebrated for its white wine, and has a considerable trade in cattle, grain, and silk. Since the opening of the Orte trunk railway, March 13, 1874, it has grown rapidly in population

and importance. From its strong position it has often been a place of refuge for the popes in troublous times. Tombs and relics discovered here make it certain that it was the site of an ancient Etruscan city, and the present name is supposed to be a corruption of *Urbs Vetus* (old city), probably applied to the ruins after the real name had been lost.

ORYX. See ANTELOPE.

OSAGE. I. A central county of Missouri, bounded N. by the Missouri river and N. W. by the Osage, and intersected by the Gasconade; area, about 850 sq. m.; pop. in 1870, 10,793, of whom 326 were colored. It has an uneven surface, and near the streams a fertile soil. The Missouri Pacific railroad passes through it. The chief productions in 1870 were 222,173 bushels of wheat, 426,563 of Indian corn, 97,320 of oats, 32,329 of potatoes, 100,018 lbs. of butter, 23,422 of wool, 119,617 of tobacco, and 2,324 tons of hay. There were 3,535 horses, 1,431 mules and asses, 3,962 milch cows, 5,726 other cattle, 12,144 sheep, and 22,532 swine. Capital, Linn. II. An E. central county of Kansas, watered by the Osage river and its branches; area, 792 sq. m.; pop. in 1870, 7,648. It is traversed by the Atchison, Topeka, and Santa Fé railroad. The surface is somewhat diversified, and the soil productive. Timber grows along the margin of the streams, and coal abounds. The chief productions in 1870 were 21,201 bushels of wheat, 221,880 of Indian corn, 30,740 of oats, 25,518 of potatoes, 99,398 lbs. of butter, 30,900 of cheese, and 10,396 tons of hay. There were 2,782 horses, 3,339 milch cows, 6,838 other cattle, 2,875 sheep, and 14,033 swine. Capital, Burlingame.

OSAGE ORANGE, the name in general use for a tree of the genus *Maclura*, closely allied to the

name. The French finding that the Indians made their bows of it, called it *bois d'arc* (bow wood), which, corrupted into *bodock*, is the common name in the southwest. It is



Fruit cut to show the structure.

also one of the several trees which are sometimes called yellow wood. The tree is commonly from 20 to 30 ft. high, but in the rich bottom lands of Texas and Arkansas it sometimes reaches 60 ft. The leaves are lance-ovate, entire, and with the upper surface very smooth and shiny. The flowers are dioecious, the sterile in small racemes of about a dozen minute, four-parted flowers, the fertile in a dense spherical cluster about the size of a cherry; each flower consisting of an unequally four-parted calyx and a single pistil, the style to which is nearly an inch long; these styles projecting all over the surface give the cluster the appearance of a globular mass of threads. As the fruit enlarges, the parts of the flowers of which it is composed become fleshy and blended in such a confused mass that it is difficult to distinguish them. When ripe, the fruit is the size of an orange, irregularly spherical, and with the surface tessellated with small protuberances, becoming yellow when ripe, and when fully mature somewhat pulpy, sweetish, but acrid and inedible; when cut open the mass shows the remains of the flowers radiating from the centre, and the seeds, which are about the size of orange seeds. The leaves and all parts of the tree have a milky juice, and this, together with its close relationship with the mulberry, early suggested the use of the foliage as food for silkworms. The reports of experiments with them are variable; while some found the leaves a poor substitute for the mulberry, others assert that the worms fed upon them give a better silk. The wood is of a fine yellow color, close-grained, hard, strong, and elastic; these qualities and its great durability make it one of the most valuable of our native woods. It is said by those who live



Osage Orange (*Maclura aurantiaca*).

mulberry (*morus*); it is the *M. aurantiaca*. The tree having been first found in the country of the Osage Indians, this fact and the appearance of the fruit are recognized in the

where the tree is abundant, that while the exposed wood may gradually waste away at the surface from the action of the weather, a rotten or decayed stick is never seen; the wood changes but little with alternate wetting and drying, and is regarded as especially valuable for wheels, and as it will take a fine polish it is suitable for ornamental work. The wood abounds in a yellow coloring matter, and the bark of the root is of an intense orange color; a related Central and South American species (*M. tinctoria*) yields the well known yellow dyewood, fustic. The bark of the Osage orange affords a fibre similar to that of the paper mulberry. (See MULBERRY.) Though not found growing wild far above the Arkansas river, the *Maclura* is hardy much further north, and endures the winter perfectly well in the climate of New York city. It is rarely seen as an ornamental tree, but it has much to commend it to the planter; it does not make so handsome a head as some other trees, but the deep green and shining leaves are more beautiful than those of the orange, and in this respect exceed those of any other hardy deciduous tree; and with the large and abundant fruit added to the fine foliage, the tree becomes highly ornamental on the lawn. The great value of the tree is as a hedge plant, on account of its general freedom from disease and insects, the fine green of its foliage, its thorny branches, and the manner in which it bears severe clippings. It may be propagated from cuttings of the roots; but for hedging, plants raised from the seed are preferred. (See HEDGE.)

OSAGE RIVER. See MISSOURI, vol. xi., p. 664.

OSAGES, a tribe of Indians of the Dakota family. Marquette in 1673 put them down on the Missouri under the name W'shage (Wasashe). They were allies of the Illinois, and before 1700 were driven down by enemies to the Arkansas. In 1712 a party of them aided the French at Detroit against the Foxes. In 1719 Dutisné visited them and set up the French arms, but the next year a Spanish expedition from New Mexico to join them in crushing out the Missouri was destroyed by the latter. The visit of some chiefs to France in 1726 confirmed their attachment. They operated with the French against the Chickasaws, and against the English in their final struggle. At the beginning of this century they were at war with the Sacs and Foxes, but peace was made in 1804. The Great Osages (Barharcha) were then chiefly at the forks of the Arkansas under Big Track, with a few on the Great Osage; the Little Osages (Oodzatan) had moved from the Missouri to the Great Osage. They were estimated in all at 6,300. They ceded some of their lands by a treaty made Nov. 10, 1808, with Papuisea, grand chief of the Big Osages, Nichu Malli of the Little, the Osages of the Arkansas under Clermont and Big Tract consenting. Government did not immediately carry out this treaty, and the Osages declared that it had been signed without authority, but

it was too late. They had been great thieves and plunderers before, and now became worse. They were constantly at war with neighboring tribes, and especially with the Cherokees, who in 1817 killed Clermont and destroyed his town. A series of treaties ceding lands followed: Sept. 12, 1815; Sept. 25, 1818; Aug. 31, 1822; June 2, and Aug. 10, 1825. They comprised at this time the Great Osages of the Osage and of the Neosho, and the Little Osages and the Chanées of the Arkansas. A mission and school of the American board were established about this time, but were abandoned in 1845. They were constantly warring with other tribes, plundering, and showing no inclination to agriculture. A visit of some to France revived the old French influence, and at their request the Jesuits began a mission in 1846. A treaty in 1839 ceded lands and led to increased annuities, but in a few years the settlement of Kansas and the consequent troubles almost drove them from their reservation, while epidemic diseases swept away many. At the beginning of the civil war about 1,000 went south; treaties in September, 1865, and May, 1868, prepared for the removal of the whole. In 1870 the tribe, reduced to 3,150, accepted an act conveying their lands in trust to the United States, and providing for their removal to Indian territory. The government had utterly failed to protect them, and their horses, cattle, and houses had been taken from them. Their new reservation was between Kansas and the Creek country, west of lon. 96°. Here they were placed under the society of Friends. Some progress in agriculture is said to have been made, 2,000 acres being planted. A school was established on the reservation, and 33 pupils were maintained at the Osage mission school in Kansas. The tribe received interest on \$300,000, and the interest of \$110,000 is applied to education. Some educational works have been issued in the language, but there is no grammar or dictionary.

OSAKA. See OZAKA.

OSBORN, Sherard, an English author, born April 25, 1822, died May 6, 1875. He entered the navy in 1837, served in the search for Sir John Franklin, in the Crimean war, and in Japan and China, where the emperor gave him in 1862 the command of a squadron for the suppression of piracy; but he withdrew from this engagement, and in 1864 assumed the command of the Royal Sovereign to test the turrets invented by Capt. Cole. Subsequently he was for a few years managing agent of the great Indian Peninsula railway at Bombay. After his return to England he became rear admiral. The lords of the admiralty delegated to him at the close of 1874, in conjunction with Rear Admirals Richards and Sir Leopold McClintock, the power to fit out an arctic expedition, to sail in 1875. His works include "Stray Leaves from an Arctic Journal" (London, 1852); "Quedah, or my Journal in Malayan Waters" (1857); "A Cruise in Japanese

Waters" (1859); "The Career, Last Voyage, and Fate of Sir John Franklin" (1860); "The Past and Future of British Relations in China" (1860); and "Japanese Fragments" (1860).

OSBORNE, a N. county of Kansas, intersected by the S. fork of Solomon river; area, 900 sq. m.; pop. in 1870, 33. The surface is rolling and consists mostly of prairies; the soil is good. Capital, Osborne.

OSBORNE, Lord Sydney Godolphin, an English philanthropist, born Feb. 5, 1808, died in 1873. He was the third son of the first Lord Godolphin, and brother of the present duke of Leeds. He graduated at Oxford in 1830, and became rector of Stoke Pogis, and in 1841 of Dorsetton, Dorsetshire. He has published "Gleanings in the West of Ireland" (London, 1850), the result of a visit to Ireland during the famine of 1847; "Lady Eva, her Last Days, a Tale" (1851); "Scutari and its Hospitals" (1855), which he visited and aided in improving; and many brief essays for the promotion of various charities.

OSCAN. See ITALIC RACES AND LANGUAGES.

OSCAR I. Joseph Francis, king of Sweden and Norway, born in Paris, July 4, 1799, died in Stockholm, July 8, 1859. He was a son of the French general Bernadotte, afterward king of Sweden, his mother being Désirée Clary, the sister of Mme. Joseph Bonaparte. He began his education at the Louis le Grand college, and was but 11 years old when his father was elected by the *Riksdag* of Sweden crown prince, as future successor of Charles XIII. He soon acquired a perfect command of the Swedish language, and showed remarkable proficiency in literature, science, and the fine arts, especially music. Some of his songs, hymns, and marches are still performed in Sweden. He gave particular attention to politics and the military art, and in 1818 entered the university of Upsal, on which occasion he was elected its chancellor. He had renounced Roman Catholicism to embrace the national or Lutheran creed. He published, besides various essays, a work "On Penal Laws and Establishments" (1841), which had a large circulation throughout Europe. On his accession to the throne, March 8, 1844, he adopted liberal measures, and caused bills to be presented to the *Riksdag* for the removal of the civil disabilities of the Jews, the freedom of manufactures and commerce, and parliamentary reform. The latter project led to violent and repeated discussions, and was baffled by the opposition of the nobility. He was more successful in his exertions for religious and temperance reforms and the improvement of the social condition of women. On the outbreak of the eastern war, in concert with the king of Denmark, he issued a declaration of armed neutrality; and on Nov. 21, 1855, he concluded a defensive treaty with France and England. Constitutional disease, increased by grief for the death of his second son Gustavus in 1852, led him, on Sept. 25, 1857, to resign his au-

thority into the hands of his eldest son, Charles, as regent. Oscar married in 1823 Joséphine Maximilienne Eugénie, daughter of Eugène Beauharnais, the son of the empress Josephine. Besides Charles XV., who succeeded him, he left two sons, Oscar Frederick, duke of Ostrogothia, and Augustus, duke of Dalecarlia, and two grandsons.

OSCAR II., king of Sweden and Norway, third son of the preceding, born Jan. 21, 1829. He succeeded his brother Charles XV. on Sept. 18, 1872. He has continued the policy of his predecessors, endeavoring to enlarge the liberty and increase the prosperity of all classes of the people. He has carried out measures of reform pending at the time of his brother's death, especially the law abolishing stamp duties on journals. He married, June 6, 1857, Sophia, daughter of William, duke of Nassau, and has four children: Gustavus, Oscar, Charles, and Eugene.

OSCEOLA. I. A N. W. central county of the S. peninsula of Michigan, drained by Muskegon river and branches of the Manistee; area, 576 sq. m.; pop. in 1870, 2,093. The surface is level, and along the streams swampy; the soil is fertile. It is traversed by the Flint and Père Marquette and the Grand Rapids and Indiana railroads. The chief productions in 1870 were 4,763 bushels of wheat, 1,127 of rye, 6,087 of Indian corn, 9,532 of oats, 653 of barley, 37,467 of potatoes, 16,490 lbs. of butter, and 2,532 tons of hay. The value of live stock was \$65,767. Capital, Hersey. II. A N. W. county of Iowa, bordering on Minnesota, and watered by Rock river, a tributary of the Big Sioux, and by the Little Sioux; area, 432 sq. m.; returned as having no population in 1870. The surface consists of undulating and fertile prairies. It is traversed by the Sioux City and St. Paul railroad.

OSCEOLA (Seminole, *As-se-he-ho-lar*), a chief of the Seminole Indians, born in Georgia in 1804, died at Fort Moultrie, near Charleston, Jan. 30, 1838. He was the son of an Indian trader, an Englishman named Powell, and his mother was the daughter of a chief. In 1808 he removed with his mother to Florida, where he became influential among the Seminoles. In 1835, while on a visit to Fort King, his wife was claimed as a slave, and carried off as such. Osceola, angry because of this and other injuries, made use of threatening expressions, and was seized by order of Gen. Thompson, the United States Indian agent, and put in irons, but released after a very short imprisonment. He lay in wait for Gen. Thompson for weeks and months, and at length finding him outside of the fort, Dec. 28, killed him and four other whites. This was the beginning of the second Seminole war. Osceola immediately took command of a band of Indians and fugitive slaves, who on the same day had surprised and massacred Major Dade and a detachment of 110 soldiers. On Dec. 31, with 200 followers, he encountered Gen. Clinch and 600 Americans

at the crossing of the Withlacoochee, and after a hard-fought action of upward of an hour was compelled to retreat. The Seminole chief was disabled early in the battle. Subsequently he fought several actions against the troops under Gen. Gaines, and on June 8, 1836, led a most daring and well conducted assault upon the fortified post at Micanopy, which was repulsed with difficulty by the garrison of 300 regular troops. On Aug. 16 he was attacked at Fort Drane, and narrowly escaped capture. For upward of a year he conducted the struggle against superior forces with energy and skill; but on Oct. 21, 1837, while holding a conference under a flag of truce with Gen. Jesup near St. Augustine, he was seized with several of his followers, and confined at Fort Moultrie.

OSCODA, a N. E. county of the S. peninsula of Michigan, intersected by the Au Sable river; area, 576 sq. m.; pop. in 1870, 70. The surface consists of rolling table lands; the soil has but moderate fertility.

OSEL. See **OESSEL**.

OSGOOD, David, an American clergyman, born in Andover, Mass., Oct. 14, 1747, died in Medford, Dec. 12, 1822. He graduated at Harvard college in 1771, studied theology in Cambridge, was ordained Sept. 14, 1774, and settled in Medford, where he continued as minister for nearly 50 years. He was a zealous federalist, and one of his sermons in 1794, occasioned by Citizen Genet's appeal to the people against the government, passed through several editions. He was a thorough Calvinist, though most of his intimate associates were Unitarians. A volume of his sermons was published after his death (Boston, 1824).

OSGOOD, Frances Sargent, an American poetess, born in Boston, June 18, 1811, died in Hingham, Mass., May 12, 1850. She was the daughter of Mr. Locke, a merchant of Boston. In 1835 she was married to Mr. S. S. Osgood, a painter, with whom she went to London, and there published a small volume entitled "The Casket of Fate," and a collection of her poems entitled "A Wreath of Wild Flowers from New England" (8vo, 1839). She afterward lived in New York, and edited several gift books. Her poems were published in 1846, and a complete collection in 1850.

OSGOOD, Samuel, an American clergyman, born in Charlestown, Mass., Aug. 30, 1812, died in New York, April 14, 1880. He graduated at Harvard college in 1832, and at the Cambridge divinity school in 1835. In 1836-'7 he was an editor of the "Western Messenger," at Louisville, Ky. In 1837 he was settled over the Unitarian church in Nashua, N. H., in 1841 was called to Westminster church, Providence, R. I., and in 1849 to the church of the Messiah, New York. From 1850 to 1854 he was an editor of the "Christian Inquirer" in New York. In 1869 he resigned his pastoral charge of the church of the Messiah after 20 years' service, and went to Europe for rest and health; and on his re-

turn in 1870 he entered the Protestant Episcopal church. He received the degree of D. D. from Harvard college in 1857, and that of LL. D. from Hobart college in 1872. He has been active in literary and educational interests in New York and New England, and was for years domestic corresponding secretary of the New York historical society. His first publications were translations from Olshausen and De Wette, "The History of the Passion" (1839), and "Human Life" (1842). His original works are: "Studies in Christian Biography" (1851); "The Hearthstone" (1854); "God with Men" (1854); "Milestones in our Life Journey" (1855); "Student Life" (1860); and "American Leaves" (1867). He contributed largely to the "Christian Examiner," and published some articles in the "North American Review," the "Bibliotheca Sacra," and the leading monthly magazines. His printed sermons, speeches, and orations are numerous. He gave his time largely to lectures and literary labor, writing for leading journals and magazines, and lecturing and speaking at colleges.

O'SHAUGHNESSY, Arthur. See supplement.

OSHIMA (big island), the name usually applied by the Japanese to the larger of a pair of adjacent islands, the smaller being called Koshima (little island). The *O* of the first is long; that of the second, short. Oshima, off the province of Idzu, is the best known of the many *oshimas* in Japanese waters. Foreigners sometimes call it Vries or Barneveld's island. It is the largest and most northern of the chain fronting the gulf of Yedo, is oval, about 8 m. long and 5 m. wide. At its centre is an active volcano, 2,556 ft. high, over which a white vapor cloud is usually floating, which at night often reflects like a mirror the glare of the fires in the crater, and forms a beacon for the mariner. In clear weather the island is a conspicuous landmark, visible for many leagues. The slopes of the mountains are well cultivated, and there are many villages with a considerable population. There is a junk harbor in the S. E. point of the island.

OSHKOSH, a city and the capital of Winnebago co., Wisconsin, on the W. shore of Lake Winnebago, at the mouth of the Upper Fox river, and on the Chicago and Northwestern and the Oshkosh and Mississippi railroads, about 80 m. N. E. of Madison, and 80 m. N. W. of Milwaukee; pop. in 1860, 6,086; in 1870, 12,663; in 1875, estimated by local authorities at more than 16,000. It extends along both banks of the river, here spanned by two railroad and two ordinary bridges, for nearly 3 m. from Lake Winnebago to Lake Buttes des Morts, and covers an area of about 8 sq. m., about half of which is closely built upon. The river is here about 600 ft. wide, forming a capacious harbor. The surrounding country is fertile, and the Wolf river, which falls into the Fox 12 m. above the city, affords communication with the rich lumber region to the north. The city is lighted with gas. The principal busi-

ness blocks are substantially built of brick, and many of the residences are surrounded with handsome grounds. The main business street is paved, and the other principal streets are gravelled and bordered with shade trees, affording fine drives. The chief public buildings are the court house; the northern state insane asylum, with a frontage of 800 ft., costing more than \$600,000; the high school building, erected at a cost of more than \$60,000; and the state normal school building. The building and grounds of the stock growers' association, where the northern state fairs are held, are worthy of mention. The trade of Oshkosh is important, the sales of merchandise amounting to about \$4,000,000 a year. Lines of steamers in the season of navigation ply to New London on the Wolf river, to Berlin on the Upper Fox, and to Green Bay; and sailing vessels transport lumber, building stone, sand, and brick to and from the E. shore of Lake Winnebago. The city is largely engaged in manufacturing, the chief establishments being 24 saw mills, 15 shingle mills, 3 foundries and machine shops (producing steam engines, circular mills, and other iron work), 8 planing mills, 7 sash and door factories, 3 wood-turning establishments, 2 match factories, 2 grist mills, 2 manufacturing of furniture, 2 of agricultural implements, 2 of steam boilers, 1 of extension tables, 1 of ornamental fence, 1 of boots and shoes, 1 of soap and candles, 1 of trunks, several of carriages, 1 of barrels, 2 ship yards, 6 breweries, 2 tanneries, lime works, &c. The annual value of the manufactures is about \$4,000,000. There are two national banks and a savings bank. Oshkosh is divided into six wards, and is governed by a mayor and a board of three aldermen from each ward. It has a small police force and a fire department. Sessions of the United States courts for the eastern district of Wisconsin are held here once a year. There are four leading hotels, an opera house, a business college, several private schools, a daily and four weekly (one German) newspapers, two monthly periodicals, and a library association possessing about 1,500 volumes. Besides the high school building there are nine public school buildings, with graded schools, attended by about 2,300 pupils. The churches, 19 in number besides two missions, are as follows: 2 Baptist, 1 Congregational, 2 Episcopal, 1 Evangelical Reformed, 2 Lutheran, 1 Lutheran Evangelical, 3 Methodist Episcopal, 1 Methodist Calvinistic, 2 Presbyterian, 3 Roman Catholic, and 1 Universalist.—Trading posts were established by the French Canadians on the site of Oshkosh soon after 1820, but the permanent settlement of the city dates from 1836. It was incorporated in 1853. Four destructive fires have swept over it: in May, 1859; May, 1866; July, 1874; and April, 1875.

OSHMOONEYN, or **Ashmoonein**. See **HERMOPOLIS MAGNA**.

OSIANDER, *Andreas*, often called by his German name of *Hosemann* or *Hossmann*, a Ger-

man reformer, born at Gunzenhausen, Franconia, Dec. 19, 1498, died Oct. 17, 1552. He studied at Leipsic, Altenburg, and Ingolstadt, became teacher of Hebrew in the Augustinian convent of Nuremberg, and in 1522 pastor of a church in that city, which post he held for 26 years. He joined Luther's party immediately after the attack on indulgences, participated in the conference in 1529 at Marburg between the Swiss and Lutheran divines in regard to the doctrine of the real presence, and was present at Augsburg in 1530, and at Schmalkalden in 1546. On the promulgation of the Augsburg *Interim* in 1548 he left Nuremberg, but was invited by Albert, duke of Prussia, to become pastor and professor of theology in the university of Königsberg. He propagated opinions concerning penitence, the divine image in man, the two natures of Christ, and justification, which were combated by Melancthon, and led to a warm controversy, which continued for years after his death, ending in the execution of his son-in-law and partisan Funck and two of his friends for sedition, treason, and promoting the false doctrines of Osiander, with the formal condemnation of their heresies (1566). Osiander was very learned and eloquent, but a violent controversialist. He published works on the "Harmony of the Gospels," on the "Last Times and the End of the World," on "Prohibited Marriages," &c.

OSIER (Fr. *osier*; Gr. *olσoc*), the name of those willows the long and pliant shoots of which are used for basket making. In England the basket makers use the name exclusively for the rods of the white osier (*salix viminalis*) and a few other soft kinds, while the



Common Osier (*Salix viminalis*). Staminate and Pistillate Catkins and Flowers.

harder and better rods produced by other species are known as basket willows, or simply willows. In English works 30 or 40 species and varieties of willow are named as producing useful osiers, some of which are naturally large trees, but are kept small by the treatment to

which they are subjected. Not only do different species and varieties furnish osiers of various qualities, but the product is affected by the kind of soil on which they grow, by the distance the plants stand apart, and by the treatment of the rods after they are cut. The points taken into account in judging of the quality of willows are toughness and elasticity; the smoothness of the surface, and its color when peeled; the readiness with which the rod may be split; the quantity of pith, and the length of the shoot in proportion to its thickness. Though the wild willows are most frequently found along the margins of streams and in wet places, moist land is not required for their successful cultivation; in England it is found impossible to raise willows of good quality upon land which would need draining if other crops were to be put upon it. The land being thoroughly prepared, as for any other crop, the sets are planted at distances depending upon the variety of willow; some are placed as close as 16 by 8 in., and coarser kinds 20 by 12 in. The sets are pieces of twigs of the previous season's growth, about a foot long, and sharpened at the lower end. A frame of slats is used to secure regularity in planting; the slats are of the proper distance apart for the rows, and upon them are cut notches indicating the places for the sets. The planter, having his hand protected by a leather shield, thrusts the sets into the soil, one at each notch on the frame, pushing them into the ground in a slanting position, and quite out of sight. The object in planting so thickly is to induce a growth of slender upright shoots, without any side branches. The shoots produced the first season after setting are small and of little or no value, but they must be carefully cut, or the crop of the second year will be much injured. The crop of the third year is expected to pay all the expenses, rent, taxes, &c., of establishing the plantation; and the land is kept in willows 10 or 12 years, when the roots are ploughed and grubbed out and the land given to some other crop. The land must all the time be kept clear of weeds, and if it shows signs of exhaustion, manure must be applied. The willows are cut as soon as the leaves fall, with a heavy hooked knife; the cutting should be close to the ground, as stumps would be liable to the attacks of insects and diseases. The rods are tied in bundles, having a girth of 3 ft. at the larger end. The after treatment of the crop depends upon the use for which it is intended. If for peeling white, the bundles are set upright with their butts in 6 or 8 in. of water; and in the following spring, when growth begins, the bark peels off readily. If for peeling buff, as it is called, the bundles are set upright until sufficiently dry to be put under cover, or stacked and thatched over. To peel these dried willows, they are steamed or boiled; the baskets made from them are much firmer and more durable than those from the white rods. The peeling is usually done by drawing

the rods through an implement made of a half-inch iron rod something like a prolonged letter V. Several machines have been invented for peeling, some of which do the work very completely. In parts of Great Britain willows are an important crop, and it is estimated that there are, including Ireland, between 6,000 and 7,000 acres devoted to their cultivation; both France and Belgium produce large quantities of excellent osiers, and many tons of the coarser kinds are exported from Holland. While every few years some interest has been awakened in this country in regard to willow culture, it has never gained much foothold, although neither climate nor soil presents any obstacle to success. Nurserymen and gardeners find a small patch of osiers very useful to furnish bands for tying up bundles of trees, to supply straight slender stakes for plants, and for various other uses; to keep such trees in a productive state, they should be headed back each autumn to induce an abundant growth of strong straight wands. In Europe osiers are also grown for hoop poles; for this purpose the plants are set about twice as far apart as for basket making, and allowed to grow two and three years before cutting.—The white or common osier of England is *salix viminalis*; it is the most rapid growing of all, producing on good land shoots 10 to 12 ft. long in one season; but it is the least tough of any of the basket willows, and brings the lowest price. It is naturalized in this country, and in the older states is not rare in wet meadows. The rose or purple willow (*S. purpurea*, also called *S. helix* and by several other synonymes) appears to be a variable species, some forms of which are highly esteemed and rank among the best small willows. The golden willow, a variety (var. *vitellina*) of the common white willow (*S. alba*), very frequent as a large tree in the older parts of the country, and readily recognized by the bright yellow color of its shoots, when treated as an osier is an excellent basket willow. The almond willow (*S. amygdalina* and *S. triandra*), called also the brown Norfolk, is much cultivated for basket work, and is regarded as the most pliable of all willows. There is perhaps no genus of plants in which so much confusion exists as among the willows, and it is very difficult to assign the proper botanical names to the many kinds in cultivation, a difficulty increased by the fact that many of them are sports, or forms fixed by selection, of one species.

OSIRIS, one of the principal divinities of ancient Egypt. The inscriptions speak of him as "king of life," "king of gods," "lord of innumerable days," and "ruler of eternity." He is represented as having a human form, and always has the head of a man. He is colored green as the god of vivification. His sacred symbols are the evergreen, the tamarisk, and a sort of ibis with two long plumes at the back of the head. He is the son of Seb (Cronos, time), and represents the element of water, symbolizing in a higher sense, according to

Brugsch (*Histoire d'Égypte*, 2d ed., 1875), finished existence, or the past. In the mythological legends he is represented as the originator of human civilization, and as engaged subsequently to his philanthropic services in a terrible contest with Typhon, or Evil (called in Egyptian Set or Sutekh). Typhon prevails; Osiris is slain, and his dead body is fitted into a chest, thrown into the Nile, and swept out to sea. Isis, the consort of Osiris, learns of his death, and ransacks the world in search of his body. She finds it mutilated by Typhon. Then Osiris descends into the infernal regions, and has a later and different existence under the name of Serapis. Typhon is eventually slain by Horus, the son of Isis. Ancient writers say the Egyptians believed that the soul of Osiris entered the bull Apis, and it is assumed that the temple of Serapis mentioned by the Greeks was the temple of Osarapi, or Osiris Apis. On the judgment of Osiris and his assessors, in the "hall of double judgment" to which all the dead are led, depended the eternal fate of the soul. The "Book of the Dead" (see EGYPT, LANGUAGE AND LITERATURE OF, vol. vi., p. 477) gives an account of the pilgrimage of the dead to Hades, where they are judged by Osiris.

OSKALOOSA, a city and the capital of Mahaska co., Iowa, on the Keokuk and Des Moines Valley and the Central Iowa railroads, 55 m. E. S. E. of Des Moines; pop. in 1870, 3,204; in 1875, 5,500, the city having been enlarged. It is situated on an elevation between the Des Moines and South Skunk rivers, and is well drained. It contains two planing mills, three founderies and machine shops, two flouring mills, two woollen factories, gas works, a grain elevator, a national and two private banks, and four hotels. There are three public school buildings, four weekly newspapers, and 12 churches. It is the seat of two colleges: Oskaloosa college, established in 1861, under the control of the Disciples, and Penn college, founded in 1873, belonging to the Friends. The former in 1873-'4 had 5 instructors and 254 students, and the latter 5 instructors and 219 students.

OSMAN. See OTHMAN.

OSMIUM, a metal belonging to the platinum group, discovered by Tennant in 1803 in platinum ore, associated with iridium, ruthenium, and small quantities of rhodium, as an alloy called osmiridium or iridosmine, and which forms the residue left after the treatment of platinum ore by aqua regia. The method for separating these different metals is that of Frémy, and depends upon the readiness with which osmium is oxidized and upon the volatility of the tetroxide produced. About 200 grammes of the platinum residue is roasted in a current of dry air in a porcelain or platinum tube heated to redness. Tetroxide of osmium or osmic acid is formed, and being volatile is passed into a series of glass flasks connected with the tube leading from the furnace, where it is condensed in beautiful needle-shaped crys-

tals. The last flask contains a solution of caustic potash to absorb any tetroxide that may remain uncondensed, and an aspirator is attached to it to draw the air through the apparatus. The oxide is then by Berzelius's method digested with hydrochloric acid and mercury in a closed vessel at 284° F. Calomel is produced by the decomposition of mercurous oxide which is formed by the union of the mercury with the oxygen of the osmic acid, and the osmium is left in a metallic state in the form of a black powder ($\text{OsO}_4 + 8\text{Hg} + 8\text{Hcl} = \text{Os} + 4\text{Hg}_2\text{Cl}_2 + 4\text{H}_2\text{O}$). The metal may also be obtained by digesting osmic acid with hydrochloric acid and zinc. The properties of osmium vary with the mode of preparation. In the black pulverulent state its specific gravity is about 10, but when heated to the fusing point of rhodium it acquires a density of 21.4. At a still higher temperature, capable of melting ruthenium and iridium and volatilizing platinum, osmium likewise volatilizes, but does not melt; and it is in fact the most refractory of all metals. In a finely divided state it is highly combustible, and is easily oxidized by nitric or nitro-muriatic acid, in both cases being converted into tetroxide. Five oxides of osmium are known, viz., OsO , Os_2O_3 , OsO_2 , OsO_3 , and OsO_4 . The first three form salts with acids; the fourth forms with a few bases salts called osmites. The tetroxide, often called osmic acid, forms salts which are very unstable; it can scarcely be regarded as a true acid, and its solution in water has no acid reaction with test paper. It is a powerful oxidizing agent, decolorizing indigo solution, and converting alcohol into aldehyde and acetic acid. Its vapor is intensely pungent, irritates the mucous membrane, and is exceedingly poisonous. According to Frémy, another oxide exists, OsO_5 , but it is very unstable. There are four chlorides, OsCl_2 , OsCl_3 , OsCl_4 , and OsCl_6 , called respectively dichloride, trichloride, tetrachloride, and hexachloride. Osmium burns in the vapor of sulphur, forming it is said fixed sulphides, analogous to the oxides. All osmium compounds when heated with excess of nitric acid yield an unpleasant odor of tetroxide of osmium.

OSMUNDA, a genus of ferns popularly known as flowering ferns. With one other genus they form the suborder *Osmundaceæ*, in which the spore cases are naked, globose, and each with a short pedicel or stalk; their surface is covered with a fine network, and they open into halves by a longitudinal slit. The name flowering fern is of course a misnomer, and was probably given on account of the showy character of the fructification. They are the largest and most conspicuous of our native ferns, and are abundant in low grounds almost everywhere, north and south, forming large clumps; each rootstock throws up numerous fronds, which are often 5 ft. high. We have three species. The royal fern, *O. regalis*, differs from the others in having twice-pinnate fronds, which bear the fructification at the top, where

it forms a showy panicle. This species is also found in Europe, where it attains a much greater size than with us; here it is rarely over 5 ft. high, but in favorable situations in England it not unfrequently grows to 8 or 10 ft., and specimens as high as 11 ft. have been



Royal Fern (*Osmunda regalis*).

found. The other two species have their sterile fronds once pinnate. Clayton's flowering fern (*O. Claytoniana*) rarely exceeds 3 ft.; from two to five pairs of the divisions in the middle of the frond are fertile, and being covered with spore cases have a very different appearance from the rest of the frond. The third species is the cinnamon fern (*O. cinnamomea*), which differs from the others in having some of its fronds entirely fertile and the others, from the same rootstock, entirely sterile. This is very common in swamps and wet places, and in early spring the unfolding sterile fronds, clothed with a rusty wool, are conspicuous; they become smooth when full-grown; the fertile fronds are in the centre, 1 to 2 ft. long, and covered with bright cinnamon-colored spore cases; these decay early, and the sterile fronds grow to a length of 4 or 5 ft.

OSNABRÜCK (commonly called in English *Osnaburg*), a city of Prussia, in the province of Hanover, capital of a district, on the Hase, 71 m. W. of Hanover; pop. in 1871, 23,308. It is surrounded with old walls, and the streets are crooked and narrow. Its cathedral was built in the 12th century. The final conference on the peace of Westphalia was held in the town hall in 1648. There are two gymnasia, two normal schools, and a school of midwifery. The manufactures consist of leather, linens, woollens, iron, machinery, and especially tobacco; all of which have recently been stimulated by increased railway facilities.—Osnabrück, with a considerable territory on both sides of the Hase, was until 1803 a bishopric, which owed its foundation to Charlemagne.

By the terms of the peace of Westphalia it was agreed that it should be alternately governed by a Roman Catholic and a Protestant bishop. The last bishop, Frederick of York, ceded the country to Hanover, in which it was designated a principality, and with Meppen, Lingen, and other territories formed the *Landdrostei* of its name. It afterward became part of the kingdom of Westphalia, then of the French empire, and after the fall of Napoleon reverted to Hanover. The inhabitants are of Saxon descent. The present diocese of Osnabrück embraces the entire district and East Friesland.

OSNABURG. See OSNABRÜCK.

OSORIO, Hieronymo, a Portuguese author, born in Lisbon in 1506, died in Tavira, Aug. 20, 1580. He studied at Salamanca, Paris, and Bologna, and became archdeacon of Evora, and subsequently bishop of Silves. At the request of Cardinal Henrique he wrote in Latin a history of the reign of King Emanuel (translated into English by James Gibbs, 2 vols. 8vo, London, 1752). Among his other works is a treatise *De Gloria Libri V*, so much admired for its pure Latinity that he has been called the Cicero of Portugal. A complete collection of his works was published in Rome by his nephew (4 vols. fol., 1592). His library was taken from Cadiz by Lord Essex in 1596, and added to the Bodleian library.

OSPREY. See FISH HAWK.

OSSIAN, a Celtic bard, who is supposed to have flourished in the 2d or 3d century of the Christian era, and whose compositions in the Celtic language were for many ages preserved among the Scottish and Irish peasantry. His father Fingal was one of the most famous of the Celtic legendary heroes. Public attention was first called to the Celtic poetry of Scotland by Alexander McDonald, who published in 1751 a volume of his own songs in Gaelic, in the English preface to which he proposed to make a collection of Gaelic poems still in existence in the highlands of Scotland, and, as he asserted, of great excellence. He is considered the ablest of the modern Gaelic poets, and was a man of good character and of much general culture; but the highlanders were at that time, in consequence of their recent rebellion, very unpopular in the rest of Great Britain, and his project met with no encouragement. Jerome Stone, a person of Saxon descent, who was principal of an academy in a Gaelic district, and had mastered the language, published in the "Scots Magazine" in November, 1755, a letter in which he said of the Gaelic: "There are compositions in it which for sublimity of sentiment, nervousness of expression, and high-spirited metaphor are hardly to be equalled among the chief productions of the most cultivated nations." This letter attracted the attention of John Home, then celebrated for his tragedy of "Douglas," and he consulted on the subject Prof. Ferguson of Edinburgh, a good Gaelic scholar, who con-

firmed the opinion expressed by Stone. In 1759 Home became acquainted with James Macpherson, then a young man of 21, of good classical education, who had already published two or three poems in English of very little merit. He was acquainted with the Gaelic language, and on being questioned by Home as to the existence of ancient Gaelic poetry answered that there was a great deal of it, and in his judgment it was very good. Home persuaded him to translate some of it into English, and he produced 16 short pieces, which he said were episodes of a long poem by Ossian on the wars of Fingal. These were published in 1760 under the title of "Fragments of Ancient Poetry collected in the Highlands of Scotland," with a commendatory preface by Hugh Blair, the distinguished critic and professor of rhetoric, to whom Home had shown the poems. They were received with great favor by the public, and excited so much interest that several eminent scholars in Scotland warmly solicited Macpherson to make a journey through the highlands in order to gather what he could of the Ossianic poems. He complied with reluctance, declaring that he was unfit for the task, but finally set out accompanied by two gentlemen, both of them good Gaelic scholars. The result of their researches was the publication in 1762 of "Fingal," and in 1763 of "Temora," with five minor poems, all translated by Macpherson into English prose of a declamatory and somewhat turgid description. They created a prodigious sensation, and almost immediately excited a fierce controversy. The poems were translated into almost all the languages of Europe, and ran through many editions. Among their eminent admirers may be mentioned Goethe, Schiller, and Napoleon. In Scotland their merit and their authenticity were maintained by nearly all the leading men of letters, while in England Dr. Johnson, whose critical authority was at that time nearly unquestioned, denounced them as impudent forgeries, the composition of Macpherson himself. Gaelic he said was the rude speech of a barbarous people, and there were no manuscripts in it more than 100 years old. In reply, it was proved that the Advocates' library at Edinburgh contained Gaelic manuscripts 500 years old, and one of even greater antiquity. The gentlemen who travelled with Macpherson in the highlands testified that they took down some of the poems from oral recitation and transcribed others from old manuscripts. Gentlemen resident in the highlands testified that they gave manuscripts to Macpherson, and other persons of unquestionable character also declared that Macpherson on his return from the highlands showed them several volumes of Gaelic manuscripts containing poems by Ossian. Macpherson, in fact, carried his manuscripts to London, deposited them with his publishers in the Strand, where they remained for a year, advertised in the newspapers that he had done

so, and offered to publish them if a sufficient number of subscribers came forward. No attention was paid to his offer or to the manuscripts, and finally Macpherson, a man of proud, irascible, and haughty nature, grew disgusted with being called a forger and a liar, and for the rest of his life treated his assailants with contemptuous indifference. Recent investigations by competent scholars seem to have clearly established the authenticity of Ossian and justified Macpherson from the charges against him.—See "The Poems of Ossian in the Original Gaelic," by the Rev. Archibald Clerk (2 vols., Edinburgh and London, 1870).

OSSOLI, Margaret Fuller, marchioness, an American authoress, born in Cambridgeport, Mass., May 23, 1810, died by shipwreck on Fire Island beach, off Long Island, July 16, 1850. She was the eldest child of Timothy Fuller, who conducted her early education. At six years of age she read Latin; at eight she began to pore over Shakespeare, Cervantes, and Molière; and her lonely studies had induced a habit of melancholy and reserve before she was sent to school at Groton, Mass. There she was remarkable for her capacity and freaks of passion, and for eccentricities. She returned home at the age of 15, and began an extended course of self-culture. She began to study German in 1832, and within a year had read the principal works of Goethe, Schiller, Tieck, Körner, and Novalis. The family removed to Groton in 1833; her father died two years afterward, leaving little property; and she began to teach languages in Boston to private classes and in Mr. Alcott's school. In 1837 she became principal of a school in Providence. Emerson thus describes her personal appearance at this period: "She was rather under the middle height; her complexion was fair, with strong fair hair. She was then, as always, carefully and becomingly dressed, and of lady-like self-possession. For the rest, her appearance had nothing prepossessing. Her extreme plainness, a trick of incessantly opening and shutting her eyelids, the nasal tone of her voice, all repelled." On better acquaintance he found her more agreeable: "She was an active, inspiring companion and correspondent, and all the art, the thought, and the nobleness in New England seemed at that moment related to her and she to it. She was everywhere a welcome guest. The houses of her friends in town and country were open to her, and every hospitable attention eagerly offered. Her arrival was a holiday, and so was her abode. She stayed a few days, often a week, more seldom a month; and all tasks that could be suspended were put aside to catch the favorable hour, in walking, riding, or boating, to talk with this joyful guest, who brought wit, anecdotes, love stories, tragedies, oracles with her." In 1839 she went to reside at Jamaica Plain in the vicinity of Boston, and in 1840 became editor of the "Dial," a quarterly journal, which she conducted for two years, aided by R. W. Emerson, George

Ripley, and others. One of her contributions to this work was afterward expanded into a volume entitled "Woman in the Nineteenth Century" (New York, 1845). In 1841 she translated and published the "Letters of Gündero and Bettina," and in 1843 made a journey to Michigan and Lake Superior, and published "Summer on the Lakes." In December, 1844, she removed to New York and became a writer for the "Tribune," principally of reviews, which were subsequently published under the title of "Papers on Art and Literature" (New York, 1846). She went to Europe in the spring of 1846, and arrived at Rome in May, 1847, where in December she was married to a Roman nobleman, the marquis Giovanni Angelo Ossoli. She was in Rome during the revolution of 1848, and during the siege of the city by the French in 1849 was, at the request of Mazzini, appointed directress of one of the hospitals for the wounded. Subsequently she wrote a history of the revolution and siege, the manuscript of which was lost at the time of her death. In May, 1850, she embarked at Leghorn in the ship Elizabeth for New York, with her husband and infant son, both of whom perished with her in the wreck of the vessel in the vicinity of its intended port. A new edition of her works, in six volumes, was published in Boston in 1874.—See "Memoirs of Margaret Fuller Ossoli," by R. W. Emerson, W. H. Channing, and J. F. Clarke (Boston, 1852).

OSSORY, Thomas Butler, earl of, an English soldier, son of James, duke of Ormond, born in the castle of Kilkenny, July 9, 1634, died July 30, 1680. He fought in the rebellion, was committed by Cromwell to the tower, and after eight months of imprisonment went to Flanders, returning with Charles II. on the restoration. He was made lieutenant general of the army in Ireland, and in September, 1666, was raised to the peerage as Lord Butler of Moore park. In the same year he distinguished himself in the naval engagement with the Dutch in the Downs, and in 1673 was made admiral of the fleet. In 1677 he commanded the English troops in the service of the prince of Orange, and greatly contributed to the defeat of Marshal Luxembourg at Mons in 1678.

OSSUNA, or Osuna. See **OSUNA**.

OSTADE, I. Adrian van, a Dutch painter, born in Lübeck in 1610, died in Amsterdam in 1685. He studied at Haarlem, and is said to have been a pupil of Rembrandt. His pictures generally represent Dutch interiors and rural fairs or sports, in which the grotesqueness of the subject is redeemed by the manner of its treatment. When in 1672 a French army approached Haarlem, he became alarmed and sold his pictures with a view of returning to Germany. Stopping at Amsterdam, he was persuaded to become a permanent resident of that city. His pictures, generally of cabinet size, are comparatively scarce, and the best have increased in value six or seven fold, those

selling for £200 or £300 at the commencement of the century subsequently commanding upward of £1,400. Ostade also made etchings from his own designs. **II. Isaac van**, brother of the preceding, born in Lübeck about 1615, died about 1670. He received his first instructions from his brother, in whose style his earliest pictures are painted. Subsequently he adopted a manner of his own, in which he proved himself an original master, and the value of those works has increased in a remarkable degree. His subjects comprise travellers halting at inns, views of Dutch villages, winter pieces, and frozen canals with skaters. Some of his finest works are in England.

OSTEND, a town of Belgium, in the province of West Flanders, on the North sea, 66 m. W. N. W. of Brussels; pop. in 1871, 15,963. Next to Antwerp it is the principal port of Belgium, and it is one of the most frequented bathing places of Europe, the annual visitors numbering about 20,000. The town is well built, and contains several churches besides the cathedral. Among the public works which have been recently constructed are a pier extending from the steamboat landing to the railway station, and a magnificent hospital. A large dock for fishing boats has been built by the government. Outside of the Bruges gate are the oyster parks or salt-water reservoirs, filled with English oysters, which after being fattened here are exported in enormous quantities as Ostend oysters, and are celebrated for their small size and delicate taste. The passengers from and for England numbered in 1873 about 45,000. The number of vessels of all kinds entering the port in the same year was 698, with an aggregate tonnage of 171,652. The imports were valued at 16,000,000 francs, besides about 30,000,000 francs worth of goods in transit between England and Prussia. The value of exports was 15,000,000 francs, consisting chiefly of butter, eggs, meat, chicory, and oil. Several sugar mills have lately been constructed in the vicinity, but the manufacturing industry is limited. —Ostend was destroyed by the sea in 1333, and for some time afterward the present place was only a fishing village. It was enclosed with walls by Philip the Good of Burgundy, and fortified in 1583 by the prince of Orange. The memorable siege of Ostend by the Spaniards, ending with the surrender of the fortress to Spinola, lasted from July, 1601, till September, 1604, and cost upward of 100,000 lives. In the war of the Spanish succession the allies captured it in 1706; and in 1715 it was ceded by Holland to Charles VI. of Austria. It was taken in 1745 by the French, and restored in 1748; and again taken by the French in 1794 and held until the peace of 1814, the English having made an unsuccessful attempt to capture it in 1798. Three American envoys to European courts, Buchanan, Mason, and Soulé, met here in October, 1854, to deliberate on the acquisition of Cuba by the United States, the result of which was the so-called "Ostend

manifesto." (See BUCHANAN.) The fortifications of Ostend were demolished in 1867.

OSTEOLOGY. See ANATOMY, and BONE.

OSTEO-MYELITIS, inflammation of the lining membrane of the bony cavities, or the endosteum, often called simply endostitis, the marrow being more or less affected. Endostitis is a more serious affection than periostitis; it is more liable to be accompanied by pyæmia, and is a common cause of death in cases of amputation and resection of the bones. When osteo-myelitis causes death and separation of a portion of bone, it constitutes one form (internal) of necrosis. The symptoms are those of inflammation of bone in general: deep, aching, intense pain, high fever and constitutional disturbance, increased temperature, rigors, and hectic. The treatment is of the same nature as that for necrosis, and is either expectant or active, or both. As it generally follows fracture or amputation, the parts may be reached, and the sequestrum (separated bone) may be removed, when detachment has fully taken place. (See AMPUTATION, and NECROSIS.)

OSTERWALD, Jean Frédéric, a Swiss clergyman, born in Neuchâtel, Nov. 25, 1663, died there, April 14, 1747. He was pastor of the Reformed church in Neuchâtel, and published *Abrégé de l'histoire de la Bible*; *Traité des sources de corruption parmi les Chrétiens*; *Traité contre l'impureté*; *Ethica Christiana*, &c. Osterwald, Turretin, and Werenfels were called the "triumvirate of Swiss divines."

OSTIA, a city of Latium, at the mouth of the Tiber, on the left bank of its southern arm, 16 m. S. W. of Rome by the Via Ostiensis. It was founded by Ancus Marcius, who established salt works there; and it evidently grew with the growth of Rome, for, though not mentioned again until the second Punic war, it had become then a port and naval station of such importance to Rome that it was one of the two colonies allowed in 207 B. C. an exemption from military service. During the civil war between Sulla and Marius, it was taken and plundered by the latter in 87 B. C.; but recovering from this attack, it subsequently became the residence of one of the four quæstors of Italy, with the title of *quæstor Ostiensis*. But the deposition constantly made by the Tiber gradually filled up its port, and the difficulty of furnishing the city with grain induced the emperor Claudius to construct an artificial harbor on the right bank of the river 2 m. W. of Ostia. This new basin was called Portus Augusti, and Trajan added an inner basin (Portus Trajani). Despite the rivalry of the town of Portus, which sprang up around the new harbor, Ostia continued to prosper, and contained in its zenith 80,000 inhabitants. But about A. D. 830 it was entirely in ruins. The modern Ostia is a small town, from which the population, excepting some 200, has been driven away by the pestilential malaria. Although originally founded on the sea, it is now 3 m. distant.

OSTEOLEPIS. See GANOIDS.

OSTIAKS. See FINNS, vol. vii., p. 207.

OSTRACION. See TRUNK FISH.

OSTRACISM (Gr. *ὀστρακισμ*), a fragment of tile, a shell), in Athenian history, the banishing from the state for a limited period of a person deemed dangerous to the republic. Grote defends ostracism as a wise measure devised by Clisthenes for removing quietly from the state a powerful party leader, before he could carry out any plot against the government. At first the banishment was for ten years, but it was afterward reduced to five. It involved no dishonor, nor any loss of property. The senate and public assembly determined whether ostracism was advisable; a day was then appointed, and a space in the agora enclosed, having ten entrances for the ten tribes, through which the citizens passed, each depositing in a prepared receptacle an oyster shell or potsherd inscribed with the name of the person whom he wished banished. The archons counted the votes, and if there were 6,000 votes against any one person, that person had to withdraw from the city within ten days. Among distinguished men ostracized were Aristides, Themistocles, and Cimon.

OSTRICH, the type of a group of terrestrial rasorial birds, with the cassowary, apteryx, dinornis and its extinct congeners, constituting the family *struthionidæ*. The genus *struthio* (Linn.) has a broad and depressed bill, with flattened culmen and strong rounded tip, the upper mandible overlapping the under; the oval nostrils are in a broad, membranous groove, near the middle of the bill; the wings are short and imperfect, with long, bending, and soft plumes; the tail moderate, composed of curled pendent feathers; tarsi very long and



African Ostrich (*Struthio camelus*).

robust, covered with hexagonal scales, transverse in front near the toes; toes two, short and strong, connected at the base by membrane, the outer short and much padded, and the other larger, with a stout, broad, flat nail. The only species is the African ostrich (*S. ca-*

melus, Linn.), the largest of present birds, and excelled in former geological epochs only by some species of *dinornis* and *palapteryx*; it stands 7 or 8 ft. high, and weighs from 80 to 100 lbs. The skeleton is much as in other birds, except that the bones of the wings are rudimentary, the sternum flat and without keel, the pubic arch united in front, and the bones almost entirely destitute of air cells. The males are of a more or less black color, except the loose feathers of the wings and tail, which are white; the female is dark brownish gray, as also are the half-grown males. The head and neck are nearly naked, and the plumage generally is very loose, admirably suited for the climate, protecting from the sun's heat and at the same time allowing perfect ventilation; the quills of the wings and tail are remarkable for the length of the barbs, which, though having barbules, remain separate from each other; it is for these long white feathers of the wings and tail that the ostrich is hunted, the best being considered those taken from the males and from the living bird; some of the plumage is so coarse as to resemble hair, and the wings have two plumeless shafts like porcupines' quills. The best ostrich feathers come from the Levant and the N. and W. coasts of Africa. Ostriches inhabit the dry sandy plains of Africa from the Barbary states and Egypt to the Cape of Good Hope. The hearing and sight are very acute, and the length of the neck and high position of the eye enable them to perceive any approaching object; they are very shy, and escape either by a quick stately walk or rapid run. When feeding the stride is from 20 to 22 in., when walking but not feeding 26 in., and when terrified from 11½ to 14 ft.; taking 12 ft. as the average stride, they would accomplish about 25 m. an hour. Bushmen clothe themselves in one of their skins, and under cover of this get near enough the stupid creatures to kill them with a poisoned arrow. When hotly pursued they sometimes turn upon their enemies, giving severe wounds with their feet. Their food consists of fruits, grain, leguminous vegetables, leaves and tender shoots, insects and snails, and such other food as can be picked up, in securing which a considerable quantity of stones is swallowed; the crop is enormous, and the gizzard very powerful; in confinement particularly, they are fond of swallowing all kinds of indigestible substances, some of which may be taken to aid in digestion, but most from mere stupid voracity. They begin to lay eggs before a spot has been fixed upon for a nest, and these solitary eggs are often found lying forsaken all over a district; the nest is a simple hollow in the sand, from 3 to 6 ft. in diameter, with a shallow border; in this are laid by a single bird or many in company from 12 to 50 or 60 eggs, which are incubated at night and left to the heat of the sun during the day; outside the nest are scattered several eggs, which the Hottentots say are for the first food of the young; the males assist in incubation,

and in taking care of the young till they can provide for themselves; when the young attain the size of a common fowl they run with great speed. The capacity of an ostrich egg is equal to that of 24 hens' eggs, and a single one will weigh 2 or 3 lbs.; the eggs have a strong disagreeable flavor, relished however by the Bushmen, who not only devour the contents but use the shells as water vessels; entire eggs are often suspended as ornaments in Mussulman and even in Christian churches in the East. The flesh of the young bird is said to be palatable, resembling that of a tough turkey; old birds are apt to be loaded with fat. The ostrich is timid and inoffensive, and easily tamed. The rearing of ostriches is a very profitable employment in South Africa, and efforts are being made to introduce the excellent breed of this region into Algeria and South America. Every pair of ostriches is kept in its own enclosure, and the eggs are either incubated by them or by a hatching machine, which latter process secures a large percentage of young birds. A pair will give as many as 20 chickens, which are stripped of their feathers for the first time when they are about 18 months old; before that time the feathers are not highly esteemed. The wholesale price of good feathers in South Africa is \$200 a pound, and the annual produce of a young bird reaches the value of about \$40. A full-grown pair of ostriches is worth \$700 to \$800, and a young bird, six months old, fetches from \$150 to \$200. Ostriches were well known in ancient times, and their brains served as food on the tables of the Romans; a poetical description of them is given in Job xxxix. 13-18.—In the genus *rhea* (Möhr), the *nandou* or American ostrich, the bill is less thick, and



American Ostrich (*Rhea Americana*).

more curved at the tip; the wings are short and imperfect, with long soft feathers; the tail not apparent; toes three, the inner the shortest. The best known species (*R. Americana*, Lath.) is about half the size of the African ostrich, of a uniform grayish tint, brownish on

the back; the head is covered with feathers, and the long plumage of the wings and rump is used only for making feather brushes. It is a shy, solitary, and very fleet bird, yet easily captured on horseback by the lasso, or by tripping it up; it runs generally against the wind; it can cross rivers, swimming with the body very deep. The food consists of roots, grasses, and sometimes mollusks and fish. The nest is a shallow excavation, in which several females deposit each from 14 to 20 eggs; many eggs are laid scattered over the plain, which the male rolls together with his bill, hatching the young and bravely defending them; it is clearly polygamous. (See supplement.)

OSTRICH FERN (*struthiopteris*), a genus of ferns, so called on account of the plume-like appearance of the fertile fronds. There is but one species in this country, *S. Germanica*, which is also a native of continental Europe, and there is probably one other in Japan. Ours



Ostrich Fern (*Struthiopteris Germanica*).

is most frequent in northern localities and in alluvial soil. The sterile fronds, sometimes 5 ft. long, are pinnate with the very numerous pinnae pinnatifid; they grow in a circular tuft from a thick rootstock, and form a vase-like cluster of great beauty; within this are the fertile fronds, much shorter than the sterile, and having the margin of their pinnae rolled back to cover the fructification, they present a very different appearance from the others. This fern is readily recognized by the fertile fronds growing within a circle of sterile ones, and by its very symmetrical form; it does not grow quite so high as some of the flowering ferns (*Osmunda*). The European catalogues give *S. Pennsylvanica*, but it is only this species under another name.

OSTROGOTHS. See **GOTHS**.

OSTROLENKA, a town of Russian Poland, in the government of Lomza, on the Narew, here crossed by a wooden bridge, 60 m. N. N. E. of

Warsaw; pop. in 1867, 3,466. On Feb. 16, 1807, the French general Savary defeated here the Russians under Essen; and on May 26, 1831, the Russians under Diebitsch, in a protracted and bloody combat, were victorious over the Poles commanded by Skrzynecki.

OSUNA, or *Ossuna*, **Pedro Tellez y Giron**, duke of, viceroy of Naples, born in Valladolid in 1579, died in 1624. He spent his childhood with his grandfather, who was viceroy in Naples, and subsequently attended the university of Salamanca. His satirical disposition drove him from the court of Philip II. After the accession of Philip III. (1598) he married a daughter of the duke of Alcalá and assumed the title of duke of Osuna. He was soon again expelled from the court, and was allowed to return only in 1607 through the influence of the duke of Lerma, and after having served with distinction in the army in Flanders. He now gained considerable influence, and became in 1611 viceroy of Sicily, and in 1616 of Naples. He opposed the claims of Venice to control the trade of the Mediterranean, and incurred the hostility of the clergy by various measures, especially by resisting the establishment of the inquisition in Naples. Being suspected of aiming to make himself absolute ruler in S. Italy with the aid of foreign powers, he was recalled in 1620, and immediately after the accession of Philip IV. put on his trial. Though not convicted, he was imprisoned in the castle of Almedas, and was said to have died by poison supplied by his wife. His son became viceroy of Sicily, and the dukes of Osuna still possess great wealth.

OSWALD, **Saint**, king of Northumbria, born about 605, died Aug. 5, 642. He was a son of King Ethelfrid, lived for several years in exile, and after his return to England vanquished the British warrior Ceadwalla and recovered the kingdom, in 634. He married Cyneburg, daughter of the West Saxon king Cynegil, on condition of his embracing Christianity. He and his wife were the earliest promoters of the Christian religion among the Anglo-Saxons. After a miraculous recovery from a dangerous illness, they took sacred vows of chastity. He fell in battle against Penda, the heathen king of Mercia, and was canonized by the church of Rome. The legends relating to Oswald became very popular, especially in Germany, and gave rise to several works, including *Die Oswaldlegende und ihre Beziehung zur deutschen Mythologie*, by Zingerle (Stuttgart, 1856).

OSWEGO, a N. W. county of New York, bounded N. W. by Lake Ontario, intersected by Oswego river, and drained by a number of streams falling into the lake; area, 1,038 sq. m.; pop. in 1870, 77,941. It has a level or undulating surface, and the soil, though generally fertile, varies greatly in different parts. The Oswego and Syracuse, the Watertown and Rome, the New York and Oswego Midland, the Rome, Watertown, and Ogdensburg, and the Southern Central railroads traverse it.

The chief productions in 1870 were 90,840 bushels of wheat, 37,714 of rye, 312,903 of Indian corn, 540,842 of oats, 28,295 of barley, 55,752 of buckwheat, 513,263 of potatoes, 2,720,914 lbs. of butter, 1,089,228 of cheese, 81,200 of wool, 285,169 of hops, 150,405 of flax, and 131,765 tons of hay. There were 12,057 horses, 35,820 milch cows, 16,888 other cattle, 20,154 sheep, and 12,415 swine; 8 manufactories of agricultural implements, 3 of packing boxes, 38 of carriages and wagons, 39 of cheese, 21 of men's clothing, 68 of cooperage, 3 of hosiery, 10 of iron castings, 25 of tanned and 11 of curried leather, 2 of engines and boilers, 1 of starch, 3 of woollen goods, 33 flour mills, 78 saw mills, and 3 planing mills. Capitals, Oswego and Pulaski.

OSWEGO, a city, port of entry, and the capital of Oswego co., New York, on the S. E. shore of Lake Ontario, at the mouth of the Oswego river, 220 m. N. W. of New York and 145 m. W. N. W. of Albany; pop. in 1850, 12,205; in 1860, 16,816; in 1870, 20,910; in 1875, estimated by local authorities at 25,000. The river divides the city into two nearly equal parts, known as East Oswego and West Oswego, which are connected by two iron drawbridges. The water front on the lake measures about $2\frac{1}{2}$ m., and on the river about 5 m. From the river the land rises in easy slopes on each side to summits about 100 ft. high, which are about a mile apart, and descends in similar slopes toward the country on either side. The lake shore consists of a bluff rising to the height of 40 to 50 ft. at the summits of the ridges which traverse the city N. and S. Oswego is one of the most handsomely located of all the lake cities, and its climate, especially in summer, is not surpassed. The average summer temperature is about 67° ; winter, 24° ; annual, 46° . The streets, laid out at right angles, are 100 ft. wide, and are ornamented with many elegant public buildings and residences. There are two public parks, one on each side of the river, which, as well as the streets in the portions occupied for residences, are beautifully shaded. The principal public buildings are the custom house and post office, of Cleveland limestone, costing \$120,000; the city hall and the county court house, of Onondaga limestone, the former costing \$130,000 and the latter \$80,000; the state armory, of brick, with stone and iron facings; and the public library, costing \$30,000 and containing 12,000 volumes. There are also several elegant school buildings, two halls, four principal hotels, and various large and substantial business blocks. In 1865, during excavations in the bed of the river, a mineral spring was discovered, which was traced back into the bank of the stream. A well 100 ft. deep having been sunk, a constant flow of water was obtained in 1870, which is sold under the name of the Deep Rock Spring water. The chief mineral ingredients are the chlorides of sodium and potassium, with smaller proportions of carbonate

of lime and chloride of magnesium. A large brick hotel, costing \$200,000, was opened near the spring in 1874.—The railroads entering Oswego are the Delaware, Lackawanna, and Western, the New York and Oswego Midland, the Rome and Oswego, and the Lake Ontario (in progress). These with connecting roads afford communication with New York, the Pennsylvania coal region, and the principal points east and west. The Oswego canal, 38 m. long, connects with the Erie canal at Syracuse. During the season of navigation a daily line of steamers runs to Chicago, stopping at intermediate points; and during the period of pleasure travel daily lines run to Toronto, Niagara Falls, the Thousand islands, and Montreal. The harbor consists of an area at the mouth of the river enclosed by jetties and breakwaters, with an entrance 300 ft. wide, and has about 3 m. of wharfage and a depth at low water of from 9 to 13 ft. The channel has a depth of 20 ft. at low water. W. of the entrance are a lighthouse and a beacon. Fort Ontario, on the right bank of the river, commands the city, the harbor and its approaches, and the lake. The construction of an outer and deeper harbor, to afford a wharfage of 4 m., was commenced by the United States government in 1871. Of the breakwater 2,700 ft. have been built, leaving about 3,000 ft. to be constructed. The number of entrances in the foreign trade for the year ending June 30, 1874, was 2,127, tonnage 351,059; clearances, 2,128, tonnage 323,750; value of imports, \$7,356,646; of exports, \$260,876. The entrances in the coastwise trade were 728, tonnage 127,423; clearances, 1,279, tonnage 228,168. The tonnage owned and registered in the district, Feb. 18, 1875, was 20,747. There are 11 grain elevators and storehouses, with an aggregate capacity of 2,165,000 bushels, at which a large portion of the western grain crops and almost the entire barley crop of Canada are handled. The receipts of lumber from Canada are extensive, and the coal trade is of growing importance, large shipments being made to Canada and the west. The following table exhibits the receipts of grain and lumber by lake, and of coal by canal and rail, the shipments of flour by canal and rail, and the value of receipts and shipments by canal, for three years:

YEARS.	Grain, bushels.	Lumber, feet.	Coal, tons.	Flour, bbls.	Canal traffic.
1872...	9,184,119	292,919,288	265,858	685,806	\$22,576,984
1873...	8,547,720	286,505,946	349,512	586,345	18,711,327
1874...	13,001,969	210,814,573	319,194	565,166	18,674,078

In 1874 there were also received 47,605,053 shingles, 2,654,126 pieces of heading, 20,787,150 laths, 3,639,900 hoops, 123,325 staves, and 411,705 pickets. The Oswego river, being very constant in volume and having in the space of 12 m. a fall of 110 ft., 34 of which are within the city limits, affords extensive water power, which is made available by means of dams and

hydraulic canals. The principal manufacturing establishments are 14 flouring mills, producing 600,000 barrels annually; the Oswego starch factory, the largest of its kind in the world; the Ames iron works, manufacturing portable steam engines; the Vulcan foundery and iron works, producing chiefly steam shovels and dredges; 2 ship yards, 3 boat-building yards, 12 cooperage establishments, 1 woollen factory, 3 car works, 2 breweries, 3 furniture factories, 2 carriage factories, &c. The starch factory has fire-proof buildings seven stories high and covering four acres, with which are connected a box factory, a foundery and machine shop, and immense storehouses. There are four national banks, with an aggregate capital of \$695,000; two state banks, \$400,000; and two savings institutions.—The city is governed by a mayor and aldermen, and has a police force and fire department. It is lighted with gas, and is supplied with water from the river, the water being pumped into two reservoirs, one on each bank, whence it is distributed through more than 20 m. of mains. The city contains the county prison, an orphan asylum, and a home for aged and indigent women. The city almshouse is on a farm about 2 m. to the west. The public schools embrace a high school and inferior grades, and the Roman Catholics have parochial schools, besides St. Louis academy. The number of pupils enrolled in the public schools in 1874 was 4,249; Catholic schools, 1,675; private schools, 137; total, 5,961. The state normal and training school occupies a fine building, and has a model school connected with it. There are two daily and two weekly newspapers, and 16 churches, viz.: 2 Baptist, 1 Congregational, 2 Episcopal, 1 Lutheran, 3 Methodist, 2 Presbyterian, and 5 Roman Catholic.—A trading post was established by the English on the site of Oswego soon after 1720, and in 1727 a rude fort was built. In 1756 the place was captured by the French and Indians, and about 150 prisoners were massacred. During the war of 1812 it was taken by the British in May of that year. It was incorporated as a village in 1828, and as a city in 1848.

OTAHEITE. See SOCIETY ISLANDS.

OTERED, a German poet of the 9th century. He was a pupil of Rabanus Maurus, and became a Benedictine in the convent of Weisenburg. He wrote *Der Krist*, one of the earliest metrical translations of the Gospel. The best editions are by Graff (1831) and Kelle (1856). It has been translated into modern German by Rapp (1858) and Kelle (1870). See also *Otfried's Evangelienbuch und die übrige althochdeutsche Poesie Karolingischer Zeit*, by Rechenberg (1862).

OTHMAN, or Osman, surnamed "the Conqueror," the founder of the Ottoman empire, and of the present reigning dynasty of Turkey, born in Bithynia in 1259, died in 1326. He is said to have been the son of Orthogrul, the leader of a horde of Turkomans who had en-

tered the service of the sultan of Roum or of Iconium. Othman succeeded his father in the command, and on the fall of the Seljuk dynasty received part of the province of Bithynia as his share in the division of the sultanate. Immediately afterward he attacked the Byzantine empire, leading his forces in July, 1299, through the unguarded passes of Mt. Olympus, and conquering the territory of Nicæa. The 27 years of Othman's reign were taken up with wars. He reduced the province of Marmora in 1307, and subdued the whole of Bithynia and neighboring provinces. Several times he had been repulsed in attacks upon Nicomedia (Ismid) and Prusa (Brusa); but the capture of the latter place by his son Orkhan, the news of which reached him on his deathbed, laid the foundation of the Turkish empire. From him it is called the Ottoman Porte; yet it is doubtful whether he ever assumed the title of sultan, although he held a court at Kara-Hissar, and coined money.

OTHMAN IBN AFFAN, the third of the caliphs, killed in Medina in 655. He was one of the earliest followers of Mohammed, whom he accompanied in his flight from Mecca to Medina, and on his return became one of his secretaries. He was designated by Omar as one of the six individuals to choose his successor, and was himself selected at the close of 644, on condition that he would govern the country according to the rules of the Koran. In 645 one of his armies reduced the province of Hamadan, and in 646 another completed the conquest of Persia, while a third took the principal cities of eastern Africa, after defeating near Tripoli Gregorius, who commanded in the name of the Greek emperor. Incursions were also made into Nubia, and in 648 the islands of Cyprus and Rhodes were plundered, these being the first maritime expeditions undertaken by the Arabs. But although fortunate in war, Othman's domestic administration became unpopular on account of his partiality to his family and favorites. He lost the silver signet ring used by the prophet, and considered by the Moslems the palladium of their empire, and also gave offence by occupying the pulpit when in the mosque at prayers, instead of a few steps lower down, as had been the custom of the preceding caliphs, though not of Mohammed. The discontent broke out into an open insurrection, which was quieted with some difficulty by concessions. But Ayesha, the widow of the prophet, bribed Othman's secretary to manage that an order to the governor of Egypt, commanding him to put to death Mohammed, son of Abubekr, should fall into the latter's hands before its delivery to the governor; whereupon Mohammed marched to Medina, entered it unopposed, and invested the palace. Deserted by his soldiers, Othman, putting the Koran in his bosom, calmly awaited his fate. He died at the age of 82, or according to some of 90 or 95. He was the first caliph who had an authentic copy of the Koran made.

OTHO, Marcus Salvius, a Roman emperor, born A. D. 32, died in April, 69. His family traced its origin to the kings of Etruria. His father, Lucius Otho, held many places of honor and trust under Tiberius. During the early years of Nero's reign Marcus Otho was his intimate associate in various excesses and debaucheries; but Nero's love for Poppæa, whom Otho had seduced from her husband, caused a coolness between them, and Otho was virtually banished by an appointment as governor of Lusitania, where he remained ten years. He was afterward active in opposition to Nero, and aided in placing Galba on the throne, A. D. 68. As a reward for this service, he expected to be named Galba's successor, but the latter adopted Piso Licinianus. This disappointment and his heavy debts made him desperate; and he said publicly that if he were not emperor soon he would be ruined. He accordingly conspired among the guards, who proclaimed him emperor, and put Galba to death, after a reign of seven months. But a few days before this event the legions in Germany had proclaimed Vitellius emperor, and Otho was scarcely seated upon the throne when he was called upon to oppose this new claimant. After an offer of a large sum to Vitellius to relinquish his claim, which was refused, he marched against him with an army, and defeated his forces in three battles; but in a general engagement near Bedriacum, between Mantua and Cremona, the army of Otho was completely defeated after a hard-fought battle. Otho himself was not upon the field, and when the news was brought to him, he settled all his affairs with great deliberation and then committed suicide, having reigned only 95 days.

OTHO I., the Great, a German emperor, born in 912, died at Memleben, Thuringia, May 7, 973. In spite of strong opposition to him in his own family, he succeeded his father, Henry the Fowler, and was crowned at Aix-la-Chapelle in 936. His whole reign of 36 years was a constant series of long and bloody wars. After quieting the opposition to himself, he was engaged in a struggle from 938 to 950 with Boleslas, duke of Bohemia, who was finally subdued and obliged to reinstate the Christian religion. He was also involved in a war with the dukes of Bavaria and Franconia, in which he was triumphant; and he strengthened his authority still more by conferring the duchy of Swabia upon his son Ludolph, that of Bavaria upon his brother Henry, and that of Lorraine upon his son-in-law Conrad, count of Worms. No less successful against foreign enemies, he made the Slavic tribes tributary as far as the Oder, and drove back the Danes, who had invaded Germany, and compelled their king to acknowledge his authority. In 946 he undertook a journey to France to aid his brother-in-law Louis (Outremer) against Hugh the Great, count of Paris, and, composing the differences between the king and his vassals, received as a reward all of Lorraine

that was still in French hands. Invited by Adelaide of Burgundy, the beautiful widow of Lothaire of Italy, whose throne had been usurped by Berenger II., he crossed the Alps in 951, defeated Berenger, took Pavia, was crowned king of Lombardy, married Adelaide, and returned to Germany. But on account of Otho's affection for his wife, and for Henry, duke of Bavaria, the enemies of both, headed by Ludolph, his son by his first wife (Eadgith, sister of the English king Athelstan), and by Conrad, duke of Lorraine, raised a civil war, which was not quelled till 954. In the mean time the Hungarians had invaded Germany, and, renewing their incursions in 955, besieged Augsburg, and were defeated (Aug. 10) on the Lechfeld near that city with terrible slaughter. Berenger revolting, Otho again passed over into Italy, was crowned king of that country by the archbishop of Mentz, and on Feb. 2, 962, was crowned emperor of the West by Pope John XII. The pope after his departure breaking his allegiance, Otho hastened again to Italy, and called a council which deposed John, and chose in his place Leo VIII. The Romans having soon after expelled Leo and recalled John, Otho returned, besieged and took Rome, deprived Benedict V., the successor of John, of his popedom, and reinstated Leo. His plan of forming an alliance with the Greek empire, by marrying his son Otho to Theophania, daughter of Romanus II., having been defeated by the obstinacy of the Byzantine court, Otho invaded lower Italy, defeated the Greeks, and took Apulia and Calabria. The new emperor of the East, John Zimisceus, hereupon consented to an alliance. Soon afterward Otho died in the height of his fame.—See Vohse's *Leben Otto's des Grossen* (Dresden, 1872).

OTHO II., a German emperor, son of the preceding, born in 955, died in Rome, Dec. 7, 983. He was crowned king of Rome during the lifetime of his father (961). He ruled Germany for a time under the guardianship of his mother, but finally retired from court, and a civil war sprang up, in which he was opposed by his cousin Henry, duke of Bavaria, assisted by Harald, king of Denmark, and others. Otho defeated Henry in 977, and gave Bavaria to his nephew Otho, duke of Swabia. The French king Lothaire having invaded Lorraine in 978 and taken Aix-la-Chapelle, Otho collected an army, drove back the invaders, and in the pursuit overran Champagne and marched to Paris, a suburb of which he burned. Civil war having broken out in Rome, he crossed the Alps in 980, repressed the dissensions there, and then marched into lower Italy with the intention of wresting from the Greeks Apulia and Calabria. For a time he was successful, and took Naples, Salerno, and in 982 Taranto; but on July 13 of that year he was defeated at Basantello in Calabria by the Greeks, who had called to their aid the Saracens of Italy. Otho himself narrowly escaped. While meditating another expedition he died.

OTHO III., a German emperor, son of the preceding, born in 980, died at Paterno, near Viterbo, Jan. 23, 1002. When three years old he was crowned king of Germany, and during his minority the government was administered by his mother Theophania, his grandmother Adelaide, his aunt, and the archbishop of Mentz. During his reign Germany was the scene of constant tumults and wars. Henry, duke of Bavaria, gained possession of his person, but was forced by the other princes of the empire to restore him to his mother. In 984 Lorraine was invaded by Lothaire, king of France, who did not succeed in effecting anything. In 996 Otho went to Italy, repressed the insurrection of Crescentius, placed one of his relatives, Bruno, on the papal throne under the name of Gregory V., and on May 21 was by him crowned emperor. After his departure Crescentius renewed his insurrection, and drove out Gregory. Otho returned in 998 and put Crescentius to death, and in 1000 made a pilgrimage to the grave of St. Adalbert, at Gnesen in Poland, and there founded an archbishopric. Visiting Italy again in 1001, he was compelled to leave Rome by the people, and shortly afterward died of fever, or according to some of poison. With him the male branch of the Saxon line became extinct. He was succeeded by Henry II.

OTHO IV., a German emperor, born in 1174, died May 19, 1218. He was the son of Henry the Lion, duke of Saxony and Bavaria, and of Matilda, sister of Richard Cœur de Lion. His youth was passed at the court of England. In 1197 the emperor Henry VI. of the house of Hohenstaufen died, and left his crown to his son Frederick II., then an infant. Otho was at that time duke of Saxony, and, supported by the Guelphs, he claimed the imperial throne. His claim was opposed by Philip of Swabia, who had the support of the Ghibellines. A civil war ensued, which ended after eight years by the flight of Otho to England, and Philip held the throne till 1208, when he was assassinated. Otho thereupon returned, was recognized as emperor, and was crowned at Rome by Pope Innocent III. in 1209. The pope made it a condition of this coronation that Otho should relinquish in favor of the church the nomination to certain benefices; but the emperor violated his oath, and was excommunicated by the pope and formally deposed by the German princes. The rightful heir Frederick, then king of Naples and Sicily, was elected in his place. A second civil war now began, and the alliance of Otho with John, king of England, added to his enemies the king of France, Philip Augustus, by whom he was beaten at the battle of Bovines in 1214. In 1215 he marched against Waldemar, king of Denmark, who had formed a league with Frederick. He captured Hamburg, but a sentence of excommunication having been issued against him, he was no longer able to carry on the war, and retired to his hereditary estates in Brunswick. His life was published by Langerfeldt in 1872.

OTHO I. (OTTO FRIEDRICH LUDWIG), king of Greece, second son of Louis I., king of Bavaria, born in Salzburg, June 1, 1815, died in Bamberg, July 26, 1867. In his 17th year he was invited by the Greeks, who had then recently achieved their independence, to fill their throne; and the proposition being approved by Great Britain, France, and Russia, in a treaty concluded in London in May, 1832, and ratified soon after by the king of Bavaria, the young prince accepted the offer, and on Feb. 6, 1833, entered Nauplia, accompanied by several officers of state who were to have the control of public affairs until he attained the age of 20. In June, 1835, he assumed the reins of government, and in the succeeding year was married in Germany to the princess Amalie of Oldenburg. The Bavarian ministers to whom he committed the management of the kingdom soon became unpopular, and as early as 1836 the people began to manifest their discontent by open rebellion. On the day of his arrival with his consort at the Piræus, Feb. 14, 1837, he signed a decree removing some of the most obnoxious foreigners from office, and substituting the Greek language for the German in official documents. In other respects the government continued to be despotic; and in September, 1843, the Greeks surrounded his palace, and compelled him to form a cabinet in which his native subjects should be properly represented, and to call a national assembly to frame a constitution. The latter instrument was promulgated in the ensuing March, the Bavarian ministers were sent home, and an auspicious era seemed about to dawn upon Greece. The reactionary tendencies of the king and his advisers soon interfered with these prospects; attempts were made to abridge the concessions granted, which the people resisted; ministry after ministry essayed without success to carry on the government. On the breaking out of the eastern war in 1853 the Greeks so strongly manifested their hostility to the Porte that an allied army of English and French was stationed at the Piræus, and a new ministry, distasteful to the king and queen, who were also warmly attached to the Russian policy, was forced into office. The people, perceiving in this an attempt to infringe the royal prerogative and insult the national dignity, were partially reconciled to their sovereign, and the unpopular ministers were obliged to retire. On the conclusion of the war the popular enmity toward the king again broke out. After several unsuccessful insurrections, the people finally organized a provisional government in Athens, which declared the throne vacant; and on Oct. 27, 1862, Otho returned to Bavaria.

OTIS, Harrison Gray, an American statesman, nephew of James Otis, born in Boston, Oct. 8, 1765, died there, Oct. 28, 1848. He graduated at Harvard college in 1783, studied law, and was admitted to the bar in 1786. In 1796 he was elected from Boston to the state legislature,

and succeeded Fisher Ames in congress, where he soon became a leader of the federal party. He served two terms in congress, and in 1801 was appointed United States district attorney for Massachusetts. Subsequently he became a member of the state legislature, and was speaker of the house from 1803 to 1805, and president of the senate from 1805 to 1811. He was chairman of the legislative committee which in 1814 reported in favor of calling a convention of the New England states at Hartford to consider the best mode of redressing the grievances inflicted on those states by the war with Great Britain. He was a leading member of that convention, and was one of the three commissioners appointed by Massachusetts to go to Washington and make a representation to the federal government. In his "Letters in Defence of the Hartford Convention" (Boston, 1824) he defended the character and intentions of that body. In 1814 he was appointed judge of the court of common pleas of Massachusetts, which office he held till 1818, when he took his seat in the United States senate, to which the legislature had elected him in the preceding year. In 1820, in the debate on the Missouri question, he advocated with great force the restriction of the extension of slavery. In 1829 he was elected mayor of Boston, and in 1832 retired from public life. He was distinguished as a popular orator, and during his later years strongly opposed the anti-slavery movement.

OTIS, James, an American orator, born at Great Marshes, now called West Barnstable, Mass., Feb. 5, 1725, died in Andover, May 23, 1783. He graduated at Harvard college in 1743, studied law in Boston, was admitted to the bar in 1748 in Plymouth, where he began to practise, and in 1750 removed to Boston. In 1760 he published a treatise entitled "The Rudiments of Latin Prosody, with a Dissertation on Letters, and the Principles of Harmony in Poetic and Prosaic Composition." His public career dates from his argument, in 1761, on the question whether the persons employed in enforcing the acts of trade should have the power to invoke generally the assistance of all the executive officers of the colony. Otis was at that time advocate general, but, deeming the writs of assistance illegal, refused to argue in behalf of them, and resigned. He was then employed upon the other side, and produced a profound impression. The judges evaded giving a decision; and the writs, although secretly granted at the next term, were never executed. The next year Otis was elected to the legislature, where his eloquence soon placed him at the head of the popular party, and justified his claim to the title of the "great incendiary of New England." On June 6, 1765, he moved that a congress of delegates be called from the several colonies. The motion was adopted, and a circular letter was sent to the other colonies, in consequence of which the stamp act congress met in New York in Octo-

ber of that year. Otis was one of the delegates to this body, and a member of the committee to prepare an address to the house of commons. In May, 1767, he was elected speaker of the provincial house, but was negatived by the governor. When Charles Townsend's plan of taxation had passed parliament, the Massachusetts house sent in 1768 another circular letter requesting the colonies to unite in some suitable measures of redress. On the message of Gov. Bernard requiring the letter to be rescinded Otis made a speech, pronounced by the friends of the government to be "the most violent, insolent, abusive, and treasonable declaration that perhaps ever was delivered." The house refused to rescind by a vote of 92 to 17. In the summer of 1769, finding that the commissioners of customs had sent accusations against him to England, charging him with treason, he inserted an advertisement in the "Boston Gazette" denouncing them. The next evening he met Robinson, one of the commissioners, in a coffee house. An altercation ensued, ending in an affray, in which Otis was overpowered by numbers and severely injured. To a cut in the head received on this occasion his subsequent derangement is attributed. In the action instituted against Robinson, he obtained an award of £2,000, which he gave up on receiving from the defendant a humble written apology. In 1770 he retired to the country for his health, but in 1771 was again chosen a representative. Nearly all the rest of his life he was deranged. He spent his last two years at Andover. At one time his mind was thought to be restored, and he returned to Boston and resumed the practice of law; but the lucid interval proving temporary, he went back to Andover, and was shortly after killed by a stroke of lightning while standing at the door of the house in which he lodged. During his derangement he destroyed all his papers. He had previously published pamphlets entitled "A Vindication of the Conduct of the House of Representatives" (1762), "The Rights of the British Colonies asserted" (1764), and "Considerations on behalf of the Colonists" (1765).—See "Life of James Otis," by William Tudor (Boston, 1823).

OTOE, a S. E. county of Nebraska, separated from Iowa and Missouri by the Missouri river, and watered by the Little Nemaha and other streams; area, about 700 sq. m.; pop. in 1870, 12,345. The Midland Pacific railroad traverses it. The E. part is mostly prairie, the W. part is timbered, and the soil is fertile. There are salt springs in the N. W. part. The chief productions in 1870 were 175,058 bushels of wheat, 632,160 of Indian corn, 109,063 of oats, 129,832 of barley, 97,062 of potatoes, 5,180 lbs. of wool, 60,180 of butter, and 14,248 tons of hay. There were 2,935 horses, 2,608 milch cows, 4,202 other cattle, 1,333 sheep, and 5,956 swine; 1 manufactory of boots and shoes, 3 of jewelry, 2 of saddlery and harness, 5 of tin, copper, and

sheet-iron ware, 2 breweries, and 3 flour mills. Capital, Nebraska City.

OTOES, or **Otoes**, an Indian tribe on the Missouri river, known to the French from about 1673 under the name of Otontanta, and calling themselves Watoohathtah. They belong to the Dakota family, were originally part of the Missouris, and claim to have come into those parts with the Winnebagoes. They long resided on the S. bank of the Platte in a permanent village of earth-covered huts. Treaties were made with them on June 24, 1817, and Sept. 26, 1825. They have for years been united with the Missouris, forming one village. The two tribes in 1873 numbered fewer than 500 souls, the Otoes still retaining their Indian dress, habits, and dwellings. Missions among them have not been successful.

OTOMIS, or **Othomis**, an Indian tribe in Mexico, inhabiting the state of Querétaro and most of Guanajuato, and numerous in the state of Mexico, with bands in Vera Cruz, Puebla, Tlaxcala, Michoacan, and San Luis Potosi, being the most widely spread tribe after the Aztecs. They are regarded as one of the oldest of the Mexican tribes, occupying the valley of Mexico before the invasion of the Toltecs, who drove them to the mountains. After the fall of the Toltecs they recovered ground, but were again overcome by the Aztecs, who drove them out, but did not hold all their conquests. Some of the Otomi bands acquired a partial civilization from the Toltecs and Aztecs. The Otomis generally submitted to the Spaniards. Conni, an Otomi chief, became a Christian, and founded Querétaro. The Otomis in the Sierra Gorda, who had been converted, in 1686 revolted, and defeated and killed Gen. Zaraza, who was sent against them; but they were finally reduced by Ardelá in 1715. They are a rude people, furnishing the unskilled labor in many parts of Mexico. Their language is peculiar. Otomi means "nothing stable;" but they style their language *hía hín*, which means "language which remained." It is harsh and poor, abounding in monosyllables, with five distinct tones. *A* has three sounds, *e* five, *i* three, *u* four, and *z* three. Nouns have no case, number, or gender. *Na* before a verb makes it a noun; before a noun it shows it to be singular, and *ya* denotes the plural. The verb is conjugated in its inseparable pronouns, the root remaining unchanged. There is a small grammar and dictionary of the Otomi by Luis de Neve y Molinía (Mexico, 1767), of which there is a French abridgment (Paris, 1863), with an attempt to show a relation between it and Chinese, but on slight grounds.

OTRANTO (anc. *Hydruntum*), a seaport of Italy, on a strait of the same name, connecting the Adriatic with the Ionian sea opposite Cape Linguetta in Albania, in the province and 23 m. S. E. of the city of Lecce; pop. about 2,000. It is connected with the East by two lines of telegraph, one to Avlona, the other to Corfu. It is the seat of an archbishop, and

contains a cathedral and some Roman remains. It was taken by the Turks in 1480, and seems to have never recovered from the check then given to its prosperity. (For Terra d'Otranto, see LECCE.)

OTRANTO, Duke of. See FOUCHÉ.

OTSEGO. **I.** A central county of New York, bounded W. by the Unadilla river, and watered by the Susquehanna river and Wharton, Butternut, Otego, Schenewas, and other creeks; area, about 1,050 sq. m.; pop. in 1870, 48,967. Its surface is traversed from N. E. to S. W. by several ridges, between which are broad valleys. Otego lake, 8 m. long and 1 m. broad, is in the northeast, and has an elevation of 1,193 ft. above tide; and Schuyler lake, about 3½ m. long, is in the northwest. The soil is various in quality, but generally fertile. It is intersected by the Albany and Susquehanna railroad and its Cherry Valley branch, the Cooperstown and Susquehanna Valley, and the Utica, Chenango, and Susquehanna Valley railroads. The chief productions in 1870 were 40,292 bushels of wheat, 24,274 of rye, 250,901 of Indian corn, 990,727 of oats, 41,003 of barley, 130,692 of buckwheat, 626,836 of potatoes, 3,566,286 lbs. of butter, 829,439 of cheese, 199,937 of wool, 2,919,629 of hops, 263,511 of maple sugar, and 188,274 tons of hay. There were 13,462 horses, 45,603 milch cows, 18,801 other cattle, 43,402 sheep, and 11,864 swine; 12 manufactories of agricultural implements, 5 of brick, 61 of carriages and wagons, 41 of cheese, 12 of tanned and 7 of curried leather, 7 of machinery, 3 of musical instruments, 28 of saddlery and harness, 8 of sash, doors, and blinds, 4 of woollen goods, 19 flour mills, 38 saw mills, and 4 planing mills. Capital, Cooperstown. **II.** A N. county of the S. peninsula of Michigan, drained by branches of the Au Sable, the Manistee, the Cheboygan, and other rivers; area, 576 sq. m.; returned as having no population in 1870. It has an undulating surface, mostly covered with pine forests.

OTTAWA. **I.** A N. county of Ohio, bounded N. E. by Lake Erie and S. E. by Sandusky bay, and intersected by Portage river; area, about 350 sq. m.; pop. in 1870, 13,364. It includes several islands in Lake Erie, and has a nearly level surface and fertile soil. The Lake Shore railroad passes through it. The chief productions in 1870 were 85,860 bushels of wheat, 115,850 of Indian corn, 58,511 of oats, 43,368 of potatoes, 203,812 lbs. of butter, 68,241 of wool, 41,674 gallons of wine, and 12,200 tons of hay. There were 2,816 horses, 2,695 milch cows, 3,535 other cattle, 21,484 sheep, and 7,774 swine; 4 manufactories of carriages and harness, 2 of hubs and wagon materials, 2 flour mills, and 22 saw mills. Capital, Port Clinton.

II. A W. county of Michigan, bordering on Lake Michigan, intersected by Grand river, and drained by Black and Pigeon rivers; area, about 550 sq. m.; pop. in 1870, 26,651. It has an undulating surface and fertile soil. It is intersected by the Detroit and Milwaukee,

the Michigan Lake Shore, and the Chicago and Michigan Lake Shore railroads. The chief productions in 1870 were 218,010 bushels of wheat, 215,043 of Indian corn, 164,643 of oats, 253,826 of potatoes, 618,130 lbs. of butter, 51,453 of wool, 80,819 of maple sugar, and 23,148 tons of hay. There were 4,324 horses, 6,514 milch cows, 6,983 other cattle, 14,943 sheep, and 7,795 swine; 9 manufactories of carriages and wagons, 6 of tanned and 4 of curried leather, 5 flour mills, and 31 saw mills. Capital, Grand Haven. **III.** A N. central county of Kansas, intersected by Solomon and Saline rivers; area, 720 sq. m.; pop. in 1870, 2,127. The surface is undulating and the soil fertile. The chief productions in 1870 were 31,246 bushels of wheat, 100,680 of Indian corn, 5,100 of oats, 12,475 of potatoes, 33,169 lbs. of butter, and 5,851 tons of hay. There were 922 horses, 1,151 milch cows, 6,166 other cattle, 827 sheep, and 1,055 swine. Capital, Minneapolis.

OTTAWA, a W. county of Quebec, Canada, separated from Ontario on the south by the Ottawa river; area, 5,706 sq. m.; pop. in 1871, 37,892, of whom 21,439 were of French, 10,873 of Irish, 2,250 of English, and 2,216 of Scotch origin or descent. It is watered by the North Petite Nation, Du Lièvre, and Gati-neau rivers, and other streams. Capital, Hull.

OTTAWA, a city and the capital of La Salle co., Illinois, on the Illinois river, just below the mouth of the Fox, and on the Illinois and

Michigan canal, and the Chicago, Rock Island, and Pacific, and the Chicago, Burlington, and Quincy railroads, 82 m. S. W. of Chicago; pop. in 1870, 7,736; in 1875 estimated by local authorities at 12,000. The city is lighted with gas, and contains many handsome residences. The chief public buildings are the court house in which the supreme court for the northern division of the state is held, and the county court house and jail. The surrounding country is fertile and abounds in coal. The Fox river has here a fall of 29 ft., affording great water power. The principal manufactories are six of agricultural implements, four of carriages, and one each of starch and glass, the last two being the largest of the kind in the state. There are several grain elevators, and large quantities of wheat are shipped from this point. The entire trade of the city is estimated at \$14,000,000 a year. It has three banks, several hotels, seven public school buildings with graded schools, three weekly newspapers (one German), the Illinois law library, and eleven churches.

OTTAWA, a city and port of entry of the province of Ontario, capital of Carleton co. and of the Dominion of Canada, on the south bank of Ottawa river, at the mouth of the Rideau, 97 m. above the St. Lawrence, and 220 m. E. N. E. of Toronto; lat. 45° 20' N., lon. 75° 42' W.; pop. in 1861, 14,669; in 1871, 21,545. It is divided into the upper and low-



The Parliament House

er town by the Rideau canal, which connects it with Kingston at the head of the St. Lawrence. The canal is here crossed by two bridges, one of stone and one of stone and iron, and has eight massive locks. The scenery in the vicinity of the city is pictu-

resque and grand. At the W. extremity are the Chaudière falls, 40 ft. high, just below which the Ottawa is spanned by a suspension bridge; and at the N. E. end two other falls, 40 ft. high, over which the Rideau flows to join the Ottawa. The streets are wide and

regular, and there are many handsome buildings of stone. The government buildings are the chief feature of the city. They form three sides of a quadrangle on an eminence known as Barrack hill, 150 ft. above the Ottawa, and cost nearly \$4,000,000. The S. side is formed by the parliament building, which is 472 ft. long and 572 ft. deep from the front of the main tower to the rear of the library, the body of the building being 40 ft. high and the central tower 180 ft. The departmental buildings run N. from this, facing inward to the square, the eastern block being 318 ft. long by 253 deep, and the western 211 ft. long by 277 deep. The buildings are constructed in the Italian Gothic style, of cream-colored sandstone. The arches of the doors and windows are of red Potsdam sandstone, the external ornamental work of Ohio sandstone, and the columns and arches of the legislative chambers of marble. The roofs are covered with green and purple slates, and the pinnacles are ornamented with iron. The legislative chambers are capacious and richly furnished, and have stained glass windows. The corner stone was laid by the prince of Wales in 1860. Excellent water works have lately been completed, and a thorough system of drainage is in progress.—Ottawa is connected by horse cars with New Edinburgh, the residence of the governor general, and with Hull on the opposite bank of the Ottawa river. It has railway communication with the principal points of the province by means of the St. Lawrence and Ottawa and the Canada Central lines. Regular lines of steamers ply in summer to Montreal, to various points on the upper Ottawa, and to Kingston through the Rideau canal. The city is the entrepot of the lumber trade of the Ottawa and its tributaries. The imports for the year ending June 30, 1874, amounted to \$1,495,169; exports, \$1,683,148. The entrances and clearances from and to the United States were each 1,174, with an aggregate tonnage of 95,722. There are several flouring mills, a number of large saw mills, manufactories of iron castings, mill machinery, agricultural implements, brooms, bricks, leather, wooden ware, &c., and seven branch banks. The city is governed by a mayor and board of aldermen, has a police force and fire department, and is lighted with gas. It contains a Roman Catholic and a Protestant hospital, three orphan asylums, a Magdalen asylum, a provincial normal school, a high school, good public schools with an average attendance of more than 2,000, a Catholic college and ecclesiastical seminary, six daily (one French) and five weekly (one French) newspapers, and 17 churches, viz.: Baptist, 1; Catholic Apostolic (Irvingite), 1; Congregational, 1; Episcopal, 3; Episcopal Methodist, 2; Presbyterian, 3; Roman Catholic, 4; Wesleyan Methodist, 2.—Ottawa was founded in 1827 by Col. By, a British officer, from whom it received the name of Bytown. It was incorporated as a city under its present

name in 1854, and was selected as the seat of the Canadian government in 1858.

OTTAWA, or *Grand*, a river of Canada, rising in the N. W. portion of the province of Quebec, in about lat. 47° N. and lon. 76° 30' W. It flows first N. W., then W., in a tortuous course through extensive lakes, for about 300 m., to Lake Temiscamingue (about lat. 47° 30', lon. 79° 30'), whence it pursues a S. E. course of about 400 m., separating Quebec from Ontario, and empties into the St. Lawrence at the upper end of the island of Montreal. The Ottawa has an irregular width, being lost in portions of its course in lakes through which it flows, while in others the waters contract to 40 or 50 yards, and are precipitated over rocks, sometimes forming beautiful cascades. Lake Temiscamingue has a length of 67 m. and a width varying from a few hundred yards to perhaps 10 m. The lower 24 m. of the river has a width of from 1 to 6 m., and is called the lake of the Two Mountains. About 75 and 95 m. respectively above the city of Ottawa are Calumet and Allumette islands, belonging to Quebec; and 6 m. above Ottawa commence the rapids which terminate in the celebrated Chaudière falls, where the waters plunge 40 ft. and partly disappear by an underground passage, the outlet of which is unknown. The river is navigable below Ottawa and for more than 160 m. above it, the rapids and falls being avoided by means of canals. The Rideau canal, from Ottawa to Kingston, opens a navigable connection with Lake Ontario. The chief tributaries of the Ottawa from the west are the Montreal, which enters Lake Temiscamingue, the Mattawan, the sources of which approach within a few miles of Lake Nipissing, the Petawawa, the Bonne Chère, the Madawaska, the Mississippi, the Rideau, which enters at the city of Ottawa, and the South Petite Nation. From the east it receives the Keepawa, a little below the mouth of the Montreal, the Du Moine, the Gatineau, nearly opposite Ottawa, the Du Lièvre, the North Petite Nation, the Rouge, and North river, or Rivière du Nord. The Gatineau has a length of 400 m., and most of the other tributaries named vary from 100 to 250 m. The Ottawa and its tributaries drain an area estimated at 80,000 sq. m. The valley of the Ottawa abounds in timber, particularly red and white pine, and forms one of the most productive lumber regions in the world.

OTTAWAS, a tribe of American Indians belonging to the Algonquin family, and residing when first known to the early French explorers on the Manitoulin islands and the N. W. shore of the Michigan peninsula, comprising the Sinagos, Kiskakons, and Keinouches. They believed in Michabou, the "great hare," a mythical personage, who formed the earth, and developed men from animals; in Mirabichi, god of the waters; and in Missabizi, "the great tiger." After the overthrow of the Hurons in 1649, the Ottawas of Manitoulin, Sagi-

naw, and Thunder bay fled from the Iroquois to the islands at the mouth of Green bay, and thence beyond the Mississippi to the country of the Sioux. Provoking these to war, they fell back to Chegoimegon before 1660 (where the Jesuits began a mission), and afterward to Mackinaw. Here they became involved with the Iroquois, and though great cowards joined the French in many of their operations. After the settlement of Detroit a part of the Ottawas settled near it. The band remaining at Mackinaw soon passed over to Arbre Croche, where the mission still subsists. The Ottawas took part in the last war of the French for Canada, and at the close Pontiac, chief of the Detroit Ottawas, did not yield, but organized a vast Indian conspiracy for the destruction of the English. (See PONTIAC.) The Ottawas of Arbre Croche did not join him. The tribe at this time numbered in all about 1,500. During the revolution they were under English influence. They joined in the treaties made by several tribes at Fort McIntosh in 1785, and Fort Harmar in 1789, but took up arms with the Miamis soon after, making peace finally at Greenville, Aug. 3, 1795. One band about this time settled on the Miami. A long series of treaties followed, sometimes by the Ottawas alone, but more frequently in connection with other tribes, ceding lands to the United States, and reserving to the band of Ottawas who had long been associated with the Ojibways and Pottawattamies a tract on the Miami 34 m. square. By the treaty of 1833 these confederated tribes ceded their lands around Lake Michigan to the United States, and agreed to take lands south of the Missouri river, where they soon ceased to be a distinct band. A band of Ottawas at Maumee, Ohio, on Aug. 31, 1836, ceded 49,000 acres in that state, and 200 removed to 34,000 acres on the Osage, south of the Shawnees. About 230 remained, some of whom followed the first band, and others scattered. The emigrant band prospered, had a Baptist mission, and soon possessed good farms and comfortable log houses. The political troubles in Kansas led to depredations on them, but steps were taken to make them citizens. By treaty of July 3, 1862, these Ottawas, numbering 207, were to be located on individual tracts, 160 acres to a family, 20,000 acres to be reserved for schools, and the rest to be sold. Under this and a subsequent act they actually became citizens in 1867, and began an ill advised college which absorbed much of their property. Their position was so uncomfortable that they asked and obtained a reservation of 24,960 acres in the Indian territory north of the Shawnees, on Blanchard's fork and Roche de Bœuf, to which they emigrated in 1870, and where they are now (1875) reduced to 142. The Ottawas in Michigan on March 28, 1836, ceded all their lands except reservations, and the treaty of 1855 gave them the option of taking up lands in severalty on these reservations. They are

at Arbre Croche, Cross village, Grand river, Gull prairie, &c., and on the shore of Lake Superior, alternating with the Ojibways, the two nations numbering nearly 5,000. In Canada there are Ottawas on Walpole, Christian, and Manitoulin islands, mingled with other Indians, numbering probably 1,000 more. They are all self-supporting, with missions of Catholic and various Protestant denominations.

OTTENDORFER, Oswald, a German-American journalist, born at Zwittau, Moravia, Feb. 26, 1826. He studied jurisprudence in Prague and Vienna, and settled in New York in 1850, when he became connected with the *New Yorker Staats-Zeitung*. After the death in that year of Mr. Jakob Uhl, proprietor of the journal (whose widow Mr. Ottendorfer married in 1859), he became its manager and subsequently its editor, and conducted it in the interest of the democratic party. As president of the German reform association, he opposed the "Tammany democrats" in 1871, and the *Staats-Zeitung* has since been independent in politics. In 1872 he was elected alderman, and in November, 1874, he was defeated as an independent candidate for mayor.

OTTER, the name of several species of carnivorous mammals, of the subfamily *lutrinae*, and family *mustelidæ* or weasels. The subfamily includes the four genera *Lutra* (Linn.), *pteronura* (Gray) or *pterura* (Wieg.), *enhydra* (Fleming), and *aonyx* (Lesson); they are all eminently aquatic animals, feeding principally upon fish. In the genus *Lutra* the dentition is: incisors $\frac{3}{2}$ - $\frac{3}{2}$, canines $\frac{1}{1}$ - $\frac{1}{1}$, premolars $\frac{4}{2}$ - $\frac{4}{2}$, molars $\frac{3}{2}$ - $\frac{3}{2}$ = 36; the upper laniary is very large, with a large accessory internal tubercle, and the lower posteriorly tuberculated; the ears are small and far apart; the head broad and blunt, and flat above; the body thick and elongated; the feet short and webbed; tail long, round, depressed toward the tip, and flat



American Otter (*Lutra Canadensis*).

beneath. The species are found in all parts of the globe, and are distinguished with difficulty from the similarity of their colors. The American otter (*L. Canadensis*, Sab.) is about $4\frac{1}{2}$ ft. long, of which the tail is $1\frac{1}{2}$, and the weight from 20 to 25 lbs.; a considerable part

of the muzzle is bare, and the nostrils are large and open; the eyes very small and very far forward; the neck long; legs short and stout. The color above is dark glossy brown, slightly lighter beneath, lower surface and sides of the head and neck dusky white. Rather awkward on land, it is a very expert diver and rapid swimmer, and very voracious; it often remains more than a minute under water, retiring with its fishy prey to a half-sunken log or the shore to devour it; it frequents clear and rapid streams or large ponds, and makes a burrow in the banks, lined with leaves and grasses, the entrance being under water. Otters have a singular habit of sliding down wet and muddy banks or icy slopes, apparently for sport, of which the hunters take advantage by setting traps at the foot of the slide; they are also taken in sunken traps baited with fish; when killed in the water, the body sinks from the solidity of the bones. When taken young, they are easily domesticated. They bring forth a litter of two or three, between February and April, according to latitude. They are found over almost the whole of North America, and perhaps a portion of South America; rare in the Atlantic states, they are not abundant anywhere in the settled regions, but most so in the British possessions, whence several thousand skins are annually carried to England; the fur is of two kinds, like that of the beaver, one being short, soft, and dense, the other longer, coarser, and scattered through the first, and it is much esteemed for caps and gloves. The *L. Brasiliensis* (Ray), the *loutra* or river wolf of South America, has the muzzle entirely hairy except around the nostrils; the color is yellowish brown, and the throat whitish; the length is about 3½ ft.; they live in troops, rising frequently to the surface of the streams, and snapping like dogs. The European otter (*L. vulgaris*, Erxl.) is about 3½ ft. long, of which the tail is 15 in., resembling in colors and in habits the Canada otter; its fur is valuable, and its flesh, like that of several other aquatic mammals, may be eaten by Catholics during Lent. It is found throughout Europe and northern and temperate Asia, and its hunting affords great sport. The Pondicherry otter, a variety of the common species, is frequently domesticated, and taught to drive fish into the nets, or even to catch them in the teeth and bring them to its master.—In the genus *pteronura* (Gray) the muzzle is hairy; the feet large and widely webbed; the tail elongated, subcylindrical, with a fin-like dilatation on each side of the hinder half; it seems intermediate between *lutra* and *enhydra*. The *P. Sambachii* (Gray), from Demerara, is of liver-brown color, with chin and throat yellowish; the length is about 28 in., of which the tail is 12; the genus is peculiar to South America, and may be distinguished from *enhydra* by the greater size of the fore and the lesser of the hind feet. Delalande discovered at the Cape of Good Hope an otter which has

no claws on the fore feet, and mere vestiges of them on the hind in the adult condition; of this Lesson formed the genus *aonyx*. The clawless otter (*A. inunguis*, Less.) is larger than the European otter, with longer legs and less palmated feet; the color is chestnut brown above, grayish on the head and shoulders, and whitish below.—The sea otter (*enhydra ma-*



Sea Otter (*Enhydra marina*).

rina, Flem.) resembles a seal more than an otter; the head is short and very broad, the ears very small, the nose with a naked muffle; the toes of the fore feet very short, bound in a thickened membrane, densely haired and covering the claws; in the hind feet the outer toe is the longest, and these extremities are far backward as in the seals; there is one premolar less on each side of the upper jaw, and the adults are said to have only four lower incisors; in Audubon and Bachman's "Quadrupeds of North America," the dental formula is given as: incisors $\frac{2}{1}$, canines $\frac{2}{1}$, molars $\frac{3}{2}$ = 38. The body is very long, covered with a thick glossy fur; tail less than a quarter the length of the body, strong and depressed. The length in the adult is more than 5 ft., of which the tail is 1; there are two ventral mammae. The color is chestnut brown, but black in the adult in the proper season; there is a grayish tint about the head and neck; the fur is exceedingly fine and long. It inhabits the coasts and islands of the north Pacific and about Kamtchatka, coming down on the American coast as far as Monterey; it is essentially marine in its habitat, generally keeping near the coast; it is shy and timid, and hunted from boats. The skins used to form an important article of commerce between the Russians and the Chinese and Japanese. It is found on the N. W. coast of America, principally between lat. 49° and 60° N.; but the animal is now comparatively rare. The food consists of fish, lobsters, and cephalopods. It is stupid and inoffensive, and trusts for escape from its pursuers only to its speed in swimming; it produces on land a single young one at a birth. The habits of this animal are little known, and perfect skins and skulls are rare either in public or private collections.

OTTERBEIN, Philip William, founder of the church of the United Brethren in Christ, born in Dillenburg, Germany, June 4, 1726, died in Baltimore, Md., Nov. 17, 1818. He was or-

ained to the ministry in the Reformed church at Herborn in 1749, and in 1752 he was sent to America as a missionary. He was first settled at Lancaster, Pa.; afterward served congregations at Tulpehocken and York, Pa., and Frederick, Md.; and in 1774 went to Baltimore, where he established an independent congregation, over which he presided about 40 years. At Lancaster, shortly after his arrival, he experienced what he regarded as a change of heart, and as a consequence was led to hold prayer meetings, class meetings, and open-air meetings in groves. He soon associated with himself other preachers, and at the time of his death there were united with him about 100 preachers and 20,000 members. When the Methodist preachers came to Pennsylvania and Maryland, he cooperated with them, and assisted Dr. Coke in the ordination of Francis Asbury. (See UNITED BRETHREN IN CHRIST.)

OTTER TAIL, a W. central county of Minnesota, drained by Leaf river, a tributary of the Mississippi, and by the Red river, which here forms numerous lakes, the largest being Otter Tail lake and Rush lake; area, 2,016 sq. m.; pop. in 1870, 1,968. The surface consists chiefly of rolling prairies. The Northern Pacific railroad crosses the S. part. The productions in 1870 were 8,406 bushels of wheat, 6,701 of rye, 8,784 of potatoes, 14,525 lbs. of wool, and 4,262 tons of hay. The value of live stock was \$54,853. Capital, Otter Tail City.

OTTO, Friedrich Julius, a German chemist, born at Grossenhain, Saxony, Jan. 8, 1809, died in Brunswick, Jan. 13, 1870. He studied at Jena, and was subsequently employed at Brunswick and under Liebig in Giessen. In 1866 he became director of the polytechnic institute of Brunswick. He translated into German Graham's "Elements of Chemistry" (3 vols., Brunswick, 1840-'43), and in later editions made an independent work of it. Among his other works are: *Lehrbuch der rationellen Praxis der landwirthschaftlichen Gewerbe* (6th ed., 1865-'7); *Lehrbuch der Essigfabrikation* (2d ed., 1857); *Die Bierbrauerei, die Branntweinbrennerei und die Liqueurfabrikation* (1865); and *Anleitung zur Ausmittelung der Gifte* (4th ed., enlarged by Robert Otto, 1870).

OTTOCAR II., king of Bohemia, born about 1230, killed in battle, Aug. 26, 1278. During his youth he headed an insurrection of the Bohemian nobles against his father, King Wenceslas I., which resulted finally in his defeat and imprisonment. After his release he gained possession of Austria and Styria by marrying Margaret, the widow of the duke of Austria, although she at that time was 46 years old, and he himself but 23. He succeeded his father in 1253, and in 1254 undertook a crusade against the pagan Prussians, which was completely successful. In July, 1260, he achieved a signal victory over the Hungarians. Having divorced his wife, he married the Hungarian princess Cunigunda in 1261, and in 1269 the duchies of Carinthia and Carniola came into

his power. His dominions now extended from the borders of Bavaria to Raab in Hungary, and from the Adriatic to the Baltic. After the death of the German emperor Richard of Cornwall, he and Alfonso of Castile were candidates for the succession; but the choice fell on Rudolph, count of Hapsburg (1273). Ottocar refused to submit to his authority; but on Rudolph's marching into his dominions and laying siege to Vienna, he consented to a compromise by which he gave up his claims to Austria, Styria, Carinthia, Carniola, and the Windish territory (1276). Not long after he broke the treaty, but was defeated and slain in a battle on the Marchfeld with the imperial troops. Ottocar was a haughty and luxurious prince, but greatly increased the prosperity of his subjects by promoting equality and justice and founding cities and schools.—See Lorenz, *Die Geschichte Ottokars von Böhmen* (Vienna, 1866).

OTTOMAN EMPIRE. See TURKEY.

OTTO OF ROSES. See ATTAR OF ROSES.

OTTUMWA, a city and the capital of Wapello co., Iowa, on the Des Moines river, here spanned by a bridge, and on the Keokuk and Des Moines, the Central Iowa, the St. Louis, Kansas City, and Northern, and the Burlington and Missouri River railroads, 85 m. S. E. of Des Moines; pop. in 1860, 1,632; in 1870, 5,214. It is surrounded by a fertile country, and has good water power. The trade of the city amounts to about \$6,000,000 a year. The principal articles of manufacture are carriages, agricultural implements, woollens, rufflers, sewing machine attachments, cooperage, and furniture. Two firms are engaged in pork packing. There are two national banks, graded public schools, including a high school, a daily and three weekly (one German) newspapers, and nine churches. Ottumwa was incorporated as a city in 1856.

OTWAY, Thomas, an English poet, born at Trotton, Sussex, March 3, 1651, died in London, April 14, 1685. He was educated at Winchester and at Christchurch, Oxford, but left the university without taking a degree, and went to London. In 1672 he attempted to become an actor, but failed in his first appearance, and never went on the stage again. The next three years he led a dissolute life. His first piece, the tragedy of "Alcibiades," appeared in 1675. "Don Carlos," which appeared in 1676, was very successful, and "got more money than any preceding modern tragedy." In 1677 his tragedy of "Titus and Berenice," translated from Racine, and his farce, "The Cheats of Scapin," from Molière, were acted; and the same year he produced a comedy entitled "Friendship in Fashion," remarkable for its want of wit and decency, and which, though considered "very diverting" at the time, was hissed off the stage in 1749 for its immorality. In 1677 Otway received a commission as cornet in a regiment of horse designed for Flanders; but the troops being

shortly after disbanded, he returned to London miserably poor, and began again to write. In 1680 he produced the tragedy of "Caius Marius," which met with considerable success. In this play and in "The Poet's Complaint to the Muse," published the same year, he satirized the whig party. His tragedy of "The Orphan" appeared in 1680. In 1681 he produced "The Soldier's Fortune," and in 1684 its second part, "The Atheists," both of which were successful. His greatest work, "Venice Preserved," was first performed in 1682, and is still frequently acted. Otway wrote also some minor poems, and translated from the French the "History of the Triumvirate." His latter days were passed in great poverty, but the story that he died of starvation is now discredited. Pope says that he died of a fever.

OUACHITA. **I.** A N. parish of Louisiana, intersected by the Washita river; area, about 650 sq. m.; pop. in 1870, 11,582, of whom 7,823 were colored. Pine, oak, and hickory are very abundant. The North Louisiana and Texas railroad runs to the county seat. The chief productions in 1870 were 211,505 bushels of Indian corn, 17,124 of sweet potatoes, 1,987 lbs. of wool, and 14,239 bales of cotton. There were 828 horses, 1,498 mules and asses, 1,606 milch cows, 3,805 other cattle, 1,952 sheep, and 7,127 swine. Capital, Monroe. **II.** A S. W. county of Arkansas, bounded N. partly by the Little Missouri river, and S. E. partly by the Washita, which also intersects it; area, 750 sq. m.; pop. in 1870, 12,975, of whom 5,458 were colored. The surface is moderately hilly and the soil generally fertile. The chief productions in 1870 were 279,589 bushels of Indian corn, 20,680 of sweet potatoes, 20,933 lbs. of butter, and 6,467 bales of cotton. There were 1,550 horses, 1,179 mules and asses, 3,574 milch cows, 6,554 other cattle, 5,382 sheep, and 24,600 swine. Capital, Camden.

OUDE, or **Oudh** (Sanskrit, *Ayodhya*, invincible). **I.** A province of British India, formerly a native kingdom of Hindostan, lying between lat. 25° 34' and 29° 6' N., and lon. 79° 30' and 83° 11' E., bounded by the Northwest Provinces on all sides but the north and northeast, where it adjoins Nepaul; area, 23,973 sq. m.; pop. in 1872, 11,220,747. It is divided into four commissionerships, as follows: Lucknow, pop. 2,583,019; Seetapore, 2,603,426; Fyzabad, 3,384,180; Rai Bareilly, 2,650,172. The density of population is 468 to the square mile.—Oude is situated mostly within the great plain of Hindostan, which slopes S. W. from the sub-Himalaya range, and along the Nepaulese border is fringed by the malarious forest tract known as the Terai. Except in this frontier region, the scenery of the whole country is exceedingly flat and monotonous. The principal rivers are the Ganges, which forms the S. W. boundary; the Goomtee, on which is situated Lucknow, the capital of the province; the Gogra, the Raptée, and the Ramganga. All of them flow southeasterly, and are tortu-

ous streams of considerable magnitude, varying greatly in volume and navigability at different seasons of the year. Small nodules, called *kankar*, formed of the elements of chalk and oölite, are found in great quantities, and serve a useful purpose in giving sufficient consistency to some of the river banks to keep them in permanent channels. Ridges of them two or three yards wide intersect the bed of the Goomtee every five or six miles; and they have formed in different parts of the country hillocks from 70 to 80 ft. high. There are no permanent lakes, but large ponds called *jhils* are formed by the rains in the wet season, and generally dry up or are drained off by the rivers in hot weather. The largest of these, 8 m. N. W. of Manikpoor, in a deserted channel of the Ganges, is 16 m. long and 8 m. broad, and in the dry season is converted into a pestilential marsh in which rice is sown. The climate is generally dry and subject to great extremes of heat and cold, the thermometer sometimes rising to 112° and falling to 28°. November, December, January, and February are the coldest months, and the next four the hottest, a sultry west wind, loaded with fine gray dust, blowing at noon, and ceasing toward evening, or a damp malarious east wind from the swamps of Bengal and Assam occasionally prevailing all day. The power of the hot winds annually increases with the diminution of rain. Violent hurricanes and thunder storms are sometimes experienced. The rainy season begins about the middle of June and lasts from two to four months.—The forests are mainly confined to the high region adjoining Nepaul, and are important sources of fuel. The saul tree affords the most valuable timber. The forest conservancy has effected a demarcation of the tracts reserved to the state, which have been thoroughly cleared of injurious creepers. Among the wild animals are the elephant, tiger, rhinoceros, wolf, hyæna, jackal, fox, hare, deer, nilgau, wild hog, porcupine, otter, mongoose, squirrel, rat, muskrat, wild cat, bat, and flying fox. The tigers and wolves cause great destruction of life. Of the numerous varieties of birds, the parrots, which do great damage to the crops, and the kingfishers, which exist in many splendid species, are the most deserving of mention. Reptiles and insects abound. Crocodiles haunt the larger rivers. The soil is probably not surpassed in fertility by that of any other province of India; but it is of various qualities, and in some places must be abundantly irrigated. An irrigation canal connects the Ganges with the Goomtee at Lucknow. In 1872 there were 12,673 sq. m. of cultivated lands in Oude, and 5,588 sq. m. additional capable of cultivation. The crops consist principally of rice of remarkable delicacy and whiteness, various kinds of native grain, oil seeds, pulses, barley, maize, millet, wheat, opium, cotton, indigo, hemp, and tobacco. Excellent fruit trees are found in different parts of the country, among which are

the mango, the tamarind, and a species of *basia*, from the seeds of which is obtained the oil known as vegetable butter, used for food, for illuminating purposes, and in the manufacture of soap. The date palm has been introduced recently, and successfully cultivated. The domestic animals of Oude include sheep, goats, cows, bullocks, and buffaloes. Since March, 1865, there has been an agri-horticultural society at Lucknow, in connection with which there is an experimental stock farm. The principal native industry is the manufacture of coarse cotton cloth, in which a vigorous trade is carried on. Other manufactured goods have to be imported. The exports consist chiefly of agricultural products. In 1872 there were in Oude 1,678 m. of water communication, 4,225 m. of roads, and 72 m. of railway, consisting of the Oude and Rohilcund line, which connects Lucknow and Cawnpore. The administration of the government is in the hands of a chief commissioner. There is also a judicial commissioner, to whose review the decisions of the courts are subject, and the revenue is under the control of a financial commissioner.—The great bulk of the people are Hindoos, though the dominant race was Mohammedan for many ages before the British annexation. In 1869 Oude contained 7,767 Christians, 9,713,930 Hindoos, 1,011,110 Mohammedans, 56 Buddhists, and 487,884 persons of all other creeds. Hindostanee is the language most in use, with a greater admixture of Persian and Arabic and less of Hindue than in the more easterly provinces. The houses of the people are generally mud or unburnt brick, and the walls are carried up 6 or 7 ft. above the roof to form a sort of enclosed court for the use of the women, which is covered during the rains by a light temporary roofing of bamboo and grass. The rooms have no ceilings, and the floors are of earth well packed and smoothed. The most characteristic feature in the social economy of Oude is that of the village communities, each of which constitutes a little republic in itself. The payment of a land tax is one of the oldest institutions of the country. At the time of the British annexation it was supposed that the chiefs known as *talookdars*, who received this tax from the immediate cultivators of the soil and paid a fixed sum on account thereof to the native government, were merely middlemen, who exacted from the villagers as much as possible, but themselves possessed no proprietary rights whatever. Acting on the assumption that they were only collectors of revenue, the first land settlement made under British rule, in 1856-'7, disposed the talookdars of nearly all their villages, and provided for the payment of the land tax by the actual occupants of the soil directly to the government. The injustice of this settlement led to great dissatisfaction, and was ultimately admitted by the British authorities. The talookdars were in fact an ancient landed nobility, with well established rights of prop-

erty in the soil, which were entitled to recognition, notwithstanding the frequent extortion which had been practised upon the subordinate proprietors. The present land settlement, completed in 1859, recognizes the rights of both classes, confirming to each their possessions as they existed at the time of the annexation in 1856. According to the parliamentary accounts for 1871-'2, it is so framed as to secure village occupants from extortion and to exact certain duties and responsibilities from the talookdars. Half the gross rental is paid to the government. The net land revenue in 1871-'2 amounted to £1,207,902. In the same year the licenses for the sale of spirits and drugs and the excise on opium yielded £78,106. The total revenue in 1872-'3 amounted to £1,656,602; expenditures, £626,519. The total number of educational institutions in 1871-'2 was 1,548, with an average daily attendance of 37,720 pupils. They comprise the Canning college at Lucknow, with 720 students, of whom 56 were in the college department; 11 high schools and 747 village schools; and 81 schools for girls, with 1,908 pupils. The expenditure for the support of schools amounted to £47,420. In each school district a library is maintained for the use of the schoolmaster; and there is said to be a school within $4\frac{1}{2}$ m. of every child in Oude. There is a museum at Lucknow. The government has established 26 dispensaries in the province, and there is one sustained by private means. The number of jails is 13. The provincial police force, exclusive of municipal and railway police, is about 6,000 strong, and its services are especially directed toward the repression of the organized bands of thieves and robbers which infest some portions of the country. In January, 1873, the Oude military division consisted of 7,096 troops, of whom 2,663 were natives. Seven newspapers, four English and three native, are published in the province. There are 17 municipalities in Oude. The principal cities and towns are Lucknow, Oude or Ayodhya, the ancient capital, Fyzabad, Rai Bareilly, and Sultanpore.—Oude, under the name of Kosala, is supposed by many writers to have been one of the earliest seats of Indian civilization, and its first settlement is assigned to the year 1366 B. C. The Vedic legends make the ancient Ayodhya the seat of the great dynasty of solar kings. Our accurate knowledge of the country, however, dates from about A. D. 1195, when it was conquered and united to the empire of Delhi by Mohammed Bakhtiyar Ghilji, a lieutenant of Cuttub ud-Deen, the founder of the Patan or Afghan dynasty. It submitted to Baber (1528) after an obstinate struggle, but frequently revolted against the Mogul sovereigns; and about 1753 Suffdur Jung, nawaub vizier of the province, wrested from the emperor Ahmed Shah a grant in perpetuity of Oude and Allahabad, and thus founded an independent dynasty which lasted until the British annexation. His son and successor Sujah ud-Dowlah became one of the

most powerful princes of India, but, having formed an alliance with Meer Cossim against the English, was defeated by the latter at Patna, May 3, 1764, and at Buxar, Oct. 23. In 1765 the British occupied Lucknow and forced Sujah as a condition of peace to transfer the provinces of Corah and Allahabad to the emperor Shah Alum. The latter having in 1773 transferred his claim upon these territories to the Mahrattas, he was considered to have forfeited them, and the nawaub was permitted to resume them on payment of 5,000,000 rupees to the English. With the assistance of English troops, whose services he purchased for £400,000, Sujah next undertook a campaign against the Rohillas, and, having routed them in a decisive battle, April 23, 1774, annexed the greater part of Rohilcund to his dominions. His son and successor Azof ud-Dowlah, a weak and dissolute prince, ceded Benares, Joonpoor, and some contiguous districts to the British, in return for which the East India company agreed to defend him against all his enemies, and to keep a large body of troops in his territory, for whose services however he was to pay heavily. This military force was several times augmented, on the ground that the tranquillity of the country and the safety of the surrounding British possessions required it. Immense sums were also demanded from the nawaub for the support of an English resident and other English officials, so that the province was drained of its resources and parcelled out among rapacious farmers of the revenue, many of whom in time set themselves up as independent princes. The nawaub begged to have the troops withdrawn, but the British refused. At length, in September, 1781, he signed a treaty at Chunar with the governor general Warren Hastings, by which he obtained a release from some of his most burdensome engagements on condition of applying the wealth of the two begums or princesses, his mother and grandmother, to the liquidation of his debt to the East India company, which then amounted to £1,400,000. He was to retain the lands taken from the begums, and their money, of which they were said to have immense sums concealed, was to be paid over to the English. The most violent and unjustifiable means were used to get possession of the treasure, and the spoliation of the begums of Oude afterward acquired a world-wide celebrity through the denunciations of Burke and Sheridan. From 1777 to 1786 the nawaub paid the company £800,000 per annum, besides the expenses of various English officers, one of whom, an agent of the governor general, received an annual salary of £22,800. In 1787 the subsidy was reduced to £500,000 per annum, but it was increased in 1797 to £550,000, and in 1798 to £760,000, besides which the nawaub ceded the fortress of Allahabad and gave £80,000 for its repair and £30,000 for the repair of Futtehghur. In 1801 the pecuniary subsidy was commuted for a cession of various territories, equal to one half of the

whole province and yielding an annual revenue of £1,352,000. A loan of £1,000,000 was obtained from the nawaub Ghazee ud-Deen Hyder in 1814, and another of the same amount in 1815. One of these loans was liquidated in 1816 by the transfer to Oude of the Terai or marshy tract, formerly belonging to Nepal. In 1819 the nawaub with the consent of the East India company formally renounced the nominal allegiance which he had hitherto retained to the Great Mogul, and assumed the title of king. In 1825 he made a loan in perpetuity to the British of £1,000,000, at the unvarying interest of 5 per cent. He was succeeded in 1827 by his son Nusseer ud-Deen Hyder, who in 1829 made a loan of £624,000, the interest of which was to be appropriated to the support of certain members of the royal family; and in 1833 a loan of £30,000, the interest of which was to be given to the poor of Lucknow. Nusseer ud-Deen, who reigned from 1827 to 1837, made an effort at first to reform the administration, but soon gave himself up to sensual pleasures. His uncle Mohammed Ali Shah was the next monarch, who was succeeded in 1842 by his son Umjud Ali Shah, under whom the state of the kingdom grew worse and worse; but he succeeded in replenishing the treasury, and on his death in 1847 left about £1,500,000 to his son Wajid Ali, the last king of Oude. This prince was more profligate and imbecile than almost any of his predecessors. In a communication to the Indian government dated March 15, 1855, by Gen. Outram, British resident at Lucknow, the condition of the country was described as truly deplorable. The people were heavily taxed, though but little of the revenue reached the public treasury. There were no courts of law except at the capital, and the judges and other officers were venal. The police was corrupt and inefficient, and the army rapacious, licentious, undisciplined, and cowardly. Crime, oppression, and cruelty of every description prevailed. The royal government was virtually at an end, when the East India company, in January, 1856, caused a treaty to be drawn up, which would have transferred to them the entire administration of the kingdom, while it made provision for the dignity and affluence of the king and his family. This treaty the king refused to sign, whereupon a proclamation was issued by the governor general in council, Feb. 7, declaring the deposition of the king of Oude and the absolute annexation of the country to the possessions of the East India company. This measure was disapproved at the time by many English people and some East Indian officials. The deposition of the king was regarded as a violation of treaty engagements, and as both unjust and impolitic. He was allowed to retain his titles and granted a liberal pension. He removed to Calcutta, and fixed his residence at Garden Reach on the outskirts of the city. In 1856 the queen mother, accompanied by the

king's son and brother, visited England, and was received with great kindness by Queen Victoria. She remained in the country for some time urging her claims for redress, but without avail, and finally died in Paris in 1858. The talookdars of Oude felt much aggrieved by the regulations of the East India company respecting the tenure of property, and the population in fact never voluntarily submitted to the change of rulers. Hence, when the sepoy mutiny broke out in 1857, the rising in Oude was not confined to the soldiers, but became a popular war for independence. The rebel sepoys concentrated about Lucknow, while the talookdars held themselves in a state of insurrection throughout the province, armed their retainers, and threw themselves into their forts, whence the British frequently could not dislodge them without heavy loss. The complicity of the ex-king was strongly suspected, and he was kept prisoner in Castle William. One of his wives, known as the begum, who resided at Lucknow, put herself at the head of a body of insurgents, coöperated vigorously with Nana Sahib, and is supposed to have escaped to Thibet. The province was substantially subdued by the end of 1858, and in the spring and summer of 1859 the whole population was disarmed, and the difficulties of the land titles were settled by the arrangement with the talookdars before mentioned. Since that time the province has steadily prospered. (See INDIA.) **II.** A town and anciently the capital of the province, on the right bank of the Gogra, 75 m. E. of Lucknow; pop. about 8,000. It adjoins the modern town of Fyzabad, and is now almost deserted. Its principal buildings are the "fort of Hanuman," built in honor of the fabulous monkey god, the auxiliary of Rama, and having an annual revenue of 50,000 rupees settled on it by Sujah ud-Dowlah; and the ruined "fort of Rama," the mythical hero of the *Ramayana*. Oude is thought to be the most ancient city of India, and is believed to have been founded in 1366 B. C.

OUDENARDE, or **Audenarde**, a fortified town of Belgium, in the province of East Flanders, on the Scheldt, 15 m. S. S. W. of Ghent; pop. about 6,000. It has manufactures of cotton and linen, breweries and tanneries, and an active trade. It is memorable for the victory obtained here, July 11, 1708, by the allies under Marlborough and Prince Eugene over the French army commanded by the dukes of Burgundy and Vendôme.

OUUDINOT, **Achille François**. See supplement.

OUUDINOT. **I.** **Nicolas Charles**, duke of Reggio, a French soldier, born in Bar-sur-Ornain, April 26, 1767, died in Paris, Sept. 13, 1847. He early enlisted, but retired from the army in 1787. In 1792 he was elected commander of the third battalion of the Meuse, attained the rank of colonel by his defence of the castle of Bitsch, was made brigadier general in 1794, successfully conducted several operations under Moreau in the campaign of 1796 on the Dan-

ube, and became general of division in 1799. He contributed to the success of Masséna in the battle of Zürich. In command of a picked corps he shared in the campaign of 1805 against Austria, and contributed to the victory of Austerlitz. For his services in the campaigns in Prussia and Poland (1806-'7), and chiefly at Ostrolenka and Friedland, he was rewarded with the title of count and with 1,000,000 francs. In command of the vanguard of the French army in 1809, he distinguished himself at Essling and Wagram, and was created marshal and duke of Reggio, with an income of 100,000 francs. In 1812 he led the second corps in the invasion of Russia, and so skilfully protected the crossing of the Beresina that he was hailed as the "preserver of the army." In 1813 he fought at Bautzen, was defeated by Bernadotte at Grossbeeren, and severely wounded at Leipzig. On the fall of the emperor he joined the Bourbons, adhering to their cause during the hundred days. Under the second restoration he commanded the national guard of Paris, and in 1823 led the first corps of the French army in Spain. Louis Philippe made him chancellor of the legion of honor in 1839, and governor of the Invalides in 1842. **II.** **Nicolas Charles Victor**, a French soldier, son of the preceding, born Nov. 3, 1791, died July 7, 1863. He served under Napoleon I., the restoration, and Louis Philippe, participating in the expedition of Mascara (1835); was made general of division, and twice elected to the chamber of deputies. In 1848 he became a member of the constituent, and in 1849 of the legislative assembly. He commanded the expedition sent by Louis Napoleon against the Roman republic, landing at Cività Vecchia on April 25, 1849, and entering Rome, after a severe struggle, on July 2. Resuming his seat in the legislative assembly in 1851, he protested against the *coup d'état*, was imprisoned for a time, and retired to private life.

OUSSANT. See **USHANT**.

OUUSTIIL. See **MARMOSSET**.

OUNCE (*felis uncia*, Buffon; *leopardus uncia*, Gray), a medium-sized cat of the old world,



Ounce (*Leopardus uncia*).

smaller than the leopard, inhabiting the mountainous regions of Asia. Buffon distinguishes

it from the panther by its smaller size (the length of the body being only $3\frac{1}{2}$ ft.), its longer and shaggy hair, and its tail nearly as long as the body. The ground color is whitish gray on the back and sides, without tint of fulvous, and whiter below; the body is marked by blackish spots, sometimes forming irregular circles, the limbs simply spotted, and the tail ringed. It is a very active animal and an expert climber, preying upon rodents and the smaller ruminants. Cuvier and others regard it as a variety of the panther, the last also being considered the same as the leopard. Hamilton Smith considers it distinct, and Gray describes it as a species. The term ounce is frequently, but improperly, applied to the jaguar (*felis onca*).

OURO PRETO, or **Villarica**, an inland city of Brazil, capital of the province of Minas Geraes, and of a district of the same name, 170 m. N. by W. of Rio de Janeiro; pop. about 4,000. It is situated on several hills near the Itacolúmi mountain, at an elevation of 4,000 ft. above the sea, and is irregularly built, with crooked and for the most part ill-paved streets; but some of the more modern houses are well constructed. Among the public edifices, which are more remarkable for their number and dimensions than for beauty, are 15 churches, two of which are profusely decorated internally, the government house, governor's palace, treasury, museum (founded in 1864), mint, theatre, two prisons, a barrack, and a civil and a military hospital. The educational establishments include a college of pharmacy and surgery, with chairs of Portuguese and Latin, half a dozen primary schools, one private school, a public library, and a model botanic garden with a school of agriculture. Leguminous plants and fruits are the chief productions of the surrounding country. There is a considerable trade with Rio de Janeiro. Although the mountains in the vicinity are very auriferous, and the mines were once the richest in the empire, the mining is now reduced to comparatively unprofitable washings.—Ouro Preto was founded in 1699; it was named Villarica in 1711, but the first name (meaning "black gold") was restored in 1822.

OUSELEY, Gideon, an Irish clergyman, born at Dunmore, Galway, in 1762, died May 14, 1839. He was designed for the government service, but in 1789 was converted by the Wesleyan itinerants, and became a preacher. He travelled through Ireland preaching for seven years, when he was received into the Wesleyan conference, and in 1799 was appointed missionary to Ireland. It was just at the close of the rebellion, and the Catholic Irish often treated him rudely; but being a master of the Irish language, and thoroughly acquainted with the Irish character, he succeeded in converting thousands. He rode on horseback from town to town, generally addressed the crowd without dismounting, and preached from three to five times a day, laboring thus for 50 years with

great success. The best known of his writings is "Old Christianity and Papal Novelties."

OUSELEY. I. Sir William, an English orientalist, born in Monmouthshire in 1771, died in 1842. In 1788 he became cornet of dragoons, but left the army in 1794, and went to the university of Leyden, where he studied the oriental languages. In 1795 he published his "Persian Miscellanies." Afterward he went to London, and accompanied as private secretary his brother, Sir Gore Ouseley, the ambassador to the Persian court. Among his works are: "Oriental Collections" (3 vols. 4to, 1797); "Observations on some Medals and Gems, bearing Inscriptions in the Pahlavi or Ancient Persian Character" (1801); "An Abstract of the Persian Translation of the Geography written in Arabic by Ibn Haukal" (1800); and "Anecdotes from Oriental Bibliography" (1827). An account of his travels in Persia was published in 1819-'22 (3 vols. 4to). **II.** Sir William Gore, eldest son of the preceding, born July 26, 1797, died March 6, 1866. He was connected with the British legation in Stockholm in 1817 and in Washington in 1825, when he married a daughter of Governor C. P. Van Ness of Vermont. Subsequently he represented England in various capitals of South America, and was also employed on a special mission to Central America. He published "Remarks on the Statistics and Political Institutions of the United States" (1832), and "Views of South America" (1852).

OUTAGAMIE, an E. county of Wisconsin, intersected by Fox, Wolf, and Embarras rivers; area, 684 sq. m.; pop. in 1870, 18,430. Its surface is diversified and covered with forests, which yield large quantities of lumber. It is intersected by the Wisconsin division of the Chicago and Northwestern, the Milwaukee, Lake Shore, and Western, and the Green Bay and Lake Pepin railroads. The chief productions in 1870 were 353,620 bushels of wheat, 55,862 of Indian corn, 199,167 of oats, 66,051 of potatoes, 282,342 lbs. of butter, 35,445 of wool, and 18,647 tons of hay. There were 3,064 horses, 4,819 milch cows, 1,488 working oxen, 4,525 other cattle, 10,815 sheep, and 6,551 swine. Capital, Appleton.

OUTAGAMIES. See **FOXES**.

OUTLAWRY, the process by which one is excluded from the protection of the law, partly in respect to his property, and partly in respect to his person. The outlaw, says Bracton, forfeits home and country, and becomes an exile. Anciently he was known by another name, to wit, *frendlesman*, as it seems, because he forfeited his friends; for if any of them rendered him any assistance, they suffered the same punishment as the outlaw himself, losing like him both their goods and their life, unless the king of his grace spared them. From the time one was outlawed he was said anciently to bear a wolf's head (*caput lupinum gerere*), and it is usually stated, as if on the authority of Bracton, that an outlaw might be killed

with the same impunity as a wolf; but that author says plainly that one might take the outlaw's life only when he resisted being taken, or endeavored to escape. After his capture, his death or life rested in the hands of the king alone. All males above the age of 12 years might suffer outlawry, because at that age they were all sworn and enrolled in the decennary, and were thus within the law of the realm. Women were "waived," not outlawed, because they were not thus sworn. They therefore could not be excluded from the benefit of the law, but were abandoned or disregarded by it. —Outlawry was pronounced originally only in cases of treason or felony, when the defendant refused to obey a summons. Next it was extended to trespasses of a flagrant character. But properly it was limited to those processes in which a *capias* lay, that is, a writ or warrant to take the person of the defendant. In all actions of trespass *vi et armis* this *capias* lay at common law, and consequently also, in proper cases, outlawry. In actions of debt, detinue, covenant, and such others as are founded upon mere negligence or laches, *capias* did not lie at common law, and therefore outlawry was impossible until it was introduced by act of parliament. A distinction was made, in respect to the consequences of outlawry, between criminal and civil cases. In the former, sentence of outlawry operated as a conviction of the offence itself with which the accused was charged. In treasons and felonies therefore he suffered corruption of blood, and forfeiture of all his estate, real as well as personal. In civil cases the ultimate object of the outlawry was to secure access to the defendant's property. His failure to appear was, accordingly, not accounted a confession of the matter charged; but as a contempt, it deserved and drew after it a forfeiture of personal property and loss of the profits of lands so long as the outlawry lasted. An outlaw will not be heard in the courts where he seeks to originate a legal right, and his adversary may plead the outlaw's disability in bar or in abatement of his suit. Indeed, he cannot appear in court for any other purpose than to reverse his outlawry. He cannot be a juror, for he is not an unimpeached citizen, *liber et legalis homo*; but if he was outlawed in a civil action, he may be an heir or a witness. The judgment of outlawry may be reversed by writ of error or set aside on motion in the court where it is entered. In some of the United States the process of outlawry has never been known; in others it has been expressly abolished; and it now has no actual existence in any.

OUTRAM, Sir James, a British soldier, born at Butterley Hall, Derbyshire, Jan. 29, 1803, died in Pau, France, March 11, 1863. The son of an eminent civil engineer, he was educated at Marischal college, Aberdeen, went to Bombay in 1819, entered the 23d regiment of native infantry, of which he soon became adjutant, and, having distinguished himself by a suc-

cessful attack upon an insurgent stronghold in Candeish, was sent against the Bheels. He overcame them in battle, and organized from them an irregular military corps. Peace was soon restored to the Bheel country, and he was sent into Guzerat to subdue some rebel chiefs. This he effected by defeating them and conciliating them afterward. He was aide-de-camp to Sir John Keane in the Afghan war, and in 1840 took part in the capture of the Beloochee stronghold of Kelat, and, disguised as a native devotee, carried the news of its fall a week's journey through the enemy's country to Kur-rachee. For this he received the brevet rank of major, and was appointed political agent in Lower Sinde. When Sir Charles Napier undertook the conquest of Sinde, Outram was resident at Hyderabad, and endeavored to avert a collision between the ameers and the British. The princes treated him courteously, but the soldiers growing furious and attacking the residency, he defended himself with a small escort, and finally effected an orderly though dangerous retreat. He condemned the war, and was consequently involved in an acrimonious controversy with Napier. After a short visit to England, he organized an irregular but effective force against the rebels in the South Mahratta country. In 1845 he was appointed resident at Sattara, and in 1847 at Baroda, where he fell into disfavor with the Bombay government, returned to England, and finally secured the approval of the court of directors. In 1854 he was appointed political resident at Lucknow, and in 1856 was commander-in-chief of the British forces in Persia. He defeated the Persians repeatedly, but his career was stopped by the treaty of April, 1857. Returning to India, which was then in the midst of the sepoy rebellion, he took the military command of the Cawnpore and Dinapore divisions. He relieved Havelock at Cawnpore, Sept. 15, and aided him in the relief of Lucknow, Sept. 25. He conducted the defence of the residency until the rescue by Sir Colin Campbell in November, when he occupied a fort called the Alumbagh, about 4 m. from the city, and during the next few months several times defeated the rebels with great slaughter. He coöperated with Campbell in the final siege and capture of Lucknow in March, 1858, and was appointed chief civil commissioner there, and afterward member of the supreme council at Calcutta. In the summer of 1860 he returned home, and retired to private life. He was created a baronet in 1858.

OUVRARD, Gabriel Julien, a French financier, born near Clisson, Oct. 11, 1770, died in London in October, 1846. In 1797, being then a merchant at Nantes, he entered into a contract for supplying the French navy with provisions, by which he cleared more than 15,000,000 francs; and he then became the head of a great banking company at Paris, called the *négociants réunis*. This company, while holding heavy contracts for the army and navy,

undertook also to discount for the government the obligations of the receivers general and the subsidy due from the Spanish government, and thus obtained almost entire control of the finances of the country, in which it was aided by Barbé-Marbois, the minister of finance, to whom it had advanced large sums. Afterward, there having been a failure of crops in Spain, Ouvrard undertook to supply the deficiency, and received permission to export several cargoes of grain from France. He also contracted to supply the Spanish army and navy, and advanced money for the necessities of the court. In return he obtained (1805) the grant of a monopoly of trade with the Spanish colonies, including the right to import all the treasure brought thence to Europe. Seizure by British cruisers was avoided by connections which he formed with the house of Hope and other Dutch bankers established in England. The company had undertaken to discount the obligations of the receivers general at 6 per cent., while it was obliged to borrow at from 9 to 12 per cent. In October, 1805, the Spanish government, being heavily in its debt, suspended specie payments, thus preventing the company from meeting its obligations at home. It was saved from immediate bankruptcy by accommodations from Marbois and the bank of France. But in January, 1806, Napoleon compelled the company to give up all its assets, which fully liquidated its debts, amounting to about 140,000,000 francs, dismissed Marbois, and placed Ouvrard in custody at Vincennes. But Ouvrard subsequently gained influence with Fouché, who in 1810 permitted him to leave Vincennes to settle up his affairs, and upon his own authority sent him to Amsterdam, charged with the offer of very advantageous terms to England. Napoleon, discovering this scheme, dismissed Fouché, and Ouvrard was rearrested, and imprisoned at Ste. Pélagie, where he remained till 1813. In 1814, on the occupation of the allies, he contracted for the provisioning of their armies; and in 1817 the government adopted a financial system proposed by him, which proved successful. Having contracted for supplying the French army sent to Spain in 1823, proceedings were commenced against him by the government for fraudulent dealings, and he was again confined at Ste. Pélagie; but by the intercession of Ferdinand VII. he was released at the end of five years without trial, and afterward lived in obscurity in London. He published several works on finance, and *Mémoires* (3 vols., 1826).

OUZEL, a genus of birds of the thrush family, *hydrobata* (Vieill.) or *cinclus* (Bechst.). The bill is without bristles at the base, moderate, slender, slightly bent upward, with culmen nearly straight, and curved and notched tip; the frontal plumes come as far as the opening of the nostrils; wings moderate and rounded, the first quill spurious and the second rather shorter than the third and fourth, which are longest; tail very short and nearly even; tarsi

as long as middle toe, covered in front with an entire scale; feet robust, with toes moderate, the outer the longest, and united at base; claws long, curved, and sharp. About half a dozen species are described in America, Europe, and Asia. The American water ouzel or dipper (*H. Mexicana*, Baird; *C. Americanus*, Swains.) is about 7½ in. long, with an extent of wings of 10½; the color above is dark plumbeous, paler beneath; head and neck with a sooty brown tinge; a concealed white spot above the front of the eye, and sometimes below it; in young birds the feathers beneath, the wing coverts, and lesser quills are edged with grayish white; it inhabits the vicinity of clear rapid streams in the Rocky mountains from British America to Mexico. The European ouzel or dipper (*H. cinclus*, Vieill.; *C. aquaticus*, Bechst.) is of about the same size, with the head and hind neck dark brown, the upper parts dark gray with broad black edgings, throat and fore neck white, and breast brownish red; the female with less deep tints; the young grayish above,



European Ouzel (*Hydrobata cinclus*).

with black edgings. The form of the ouzels is compact, and the motions and attitudes are like those of the wrens. Their habits are very peculiar; they are found singly or in pairs in mountainous districts on the borders of streams; they seek their food under water, not plunging superficially like the kingfisher or the fish hawk, nor going under from the surface like the ducks, but darting boldly into the water from the wing, diving to the bottom, and swimming and running about there with great rapidity, in search of aquatic insects, larvæ, and mollusks, on which they feed. The ouzel is said also to devour the spawn and fry of fishes, and on this account, though probably without reason, is very generally persecuted by anglers and gamekeepers; its progression under water is by the action of the wings, as in many web-footed birds; it remains submerged for a minute or two, swimming well, rising buoyantly to the surface, and able to dive again without rising on the wing. The flight is direct and rapid; it is in the habit of perching on stones in the middle of streams, constantly moving

the tail up and down; it is a very poor walker; when wounded it plunges under water and escapes to the shore, struggling to the last when taken. The note is a gentle warble, short and lively, but not resembling the full song of the proper thrushes. It begins to make a nest about the middle of spring, of moss and leaves, on the bank of a stream, among the roots of a tree overhanging the water, in the crevice of a rock, or in a hole in a bridge, dam, or wall; it is of large size, arched over, and compactly built; the eggs are five or six, pure white, somewhat smaller than those of the song thrush. This genus is considered intermediate between the ant thrushes and thrushes proper; its short and dense plumage, short wings and tail, and bill, are admirably adapted for making its way under water, and seizing and detaching its food from submerged stones. According to Macgillivray, the genus forms a connecting link between the slender-billed land birds and the diving water birds, as the kingfisher seems to unite the former with the plunging birds of the same order.—The name of ring ouzel is given to the European thrush (*turdus torquatus*, Linn.) from its having a broad white crescent across the black of the breast; and the blackbird (*T. merula*, Linn.) is often also called ouzel in Great Britain.

OVEN BIRD, the popular name of a group of tenuirostral birds of the subfamily *furnariinae* and the family of creepers, inhabiting the warm parts of South America and the West Indies. In the typical genus *furnarius* (Vieill.) the bill is moderate, slender, and slightly curved; wings and tail moderate, and tarsi long. The red oven bird (*F. rufus*, Vieill.), called *hornero* in La Plata, is about 6 in. long, reddish above and white below; it is seen generally in pairs, both in bushy and open places and near human habitations, running rapidly or making short flights from bush to bush in search of insects, especially *coleoptera*; it will also eat seeds; the note is loud and shrill. The nest is



Red Oven Bird (*Furnarius rufus*).

placed in an exposed situation on a tree, paling, window sill, or even in the interior of a house; both sexes work at it, alternately bringing a lump of clay or piece of straw and twig, which

they fashion into a dome-shaped structure like a baker's oven, 6 or 8 in. in diameter and with walls about an inch thick; the opening is on the side, and near it is a partition reaching nearly to the roof, behind which is an inner chamber in which the eggs, four or five, are deposited on feathers and soft grass. The genus *cinclodes* (Gray) frequents the sea beach, and may often be seen walking on the masses of floating seaweed near the shore; some occasionally wander inland, and even to the height of 8,000 ft. on the Cordilleras; their food consists of insects, small crustaceans and mollusks, and seeds. The golden-crowned thrush of North America (*seiturus aurocapillus*, Swains.) is also called oven bird from the shape of its nest.

OVERBECK. **I. Friedrich**, a German painter, born in Lübeck, July 3, 1789, died in Rome, Nov. 12, 1869. He commenced his artistic education in Vienna in 1806, and in 1810 repaired to Rome, where he became convinced that a return to the truth and simplicity of the early Italian masters was necessary. A Madonna painted in 1811 first brought him into notice in Rome, and was followed by the frescoes of "Joseph sold into Captivity by his Brethren" and the "Seven Years of Famine," in the villa of the Prussian consul Bartholdy. He gradually restricted himself to works of an exclusively devotional character, which he strove to imbue with religio-mystic feeling. In 1814, in company with several of his associates, he abjured Lutheranism and embraced the Roman Catholic faith. His life was afterward passed almost entirely in Rome. At first he was surrounded by a band of enthusiastic disciples, but by degrees his followers became fewer. He however continued to labor in his chosen style with unabated zeal until his death. Of Overbeck's works in fresco, the most remarkable are a series of five representing subjects from Tasso's *Jerusalem liberata*, executed in 1817 in the villa Massimi in Rome, and the "Vision of St. Francis" painted for the church of the Madonna degli Angioli near Assisi, the latter of which is considered a remarkable exposition of the principles of Christian art as understood by him. The picture which first gave him a European reputation was the "Entry of Christ into Jerusalem," completed in 1824 for the Marienkirche in Lübeck, and which is well known by engravings. Other works by him of a Scriptural character are "Christ bearing the Cross," "The Child Christ in the Temple," "Christ blessing Little Children" (also well known through engravings), "The Raising of Lazarus," "Christ raising the Daughter of Jairus," "Christ on the Mount of Olives," "St. John preaching in the Wilderness," "Moses and the Daughter of Jethro at the Well," "Gathering the Manna," "Hagar in the Desert," and "The Ascent of Elijah." His numerous "Holy Families" and Pietàs, "Marriage of the Virgin," "Virgin with the Lily," "Three Kings,"

"St. Elizabeth," "Assumption of the Virgin," &c., are examples of his manner of illustrating the traditions of the church. His masterpiece perhaps is the elaborate composition in the Städel'sche institute at Frankfurt, representing the triumph of Christianity in the arts. As a designer in charcoal and chalk, Overbeck is perhaps more generally known than by his paintings; and engravings have been made from his "Passion of our Lord," "Forty Illustrations from the Gospels," and similar series of drawings. He also designed a remarkable series of cartoons to be executed in fresco in the chapel of the banker Torlonia's villa at Castel Gandolfo. Occasionally he attempted allegorical figures, such as his "Germania" and "Italia." Among his latest works were the cartoons for mural paintings for a large Catholic church in Jakova, Albania, and seven pictures representing the seven sacraments. **II. Johannes Adolf**, a German archaeologist, nephew of the preceding, born in Antwerp, March 27, 1826. He graduated at Bonn in 1850, and became professor in the university of Leipzig in 1853, and founded its archaeological museum. His principal works are: *Geschichte der griechischen Plastik* (2 vols., 1857-'8; 2d ed., 1869-'70); *Pompeji in seinen Gebäuden, Alterthümern und Kunstwerken* (1856; 2d ed., 2 vols., 1866); and *Griechische Kunstmythologie* (3 vols. and atlas, 1871-'8).

OVERBURY, Sir Thomas, an English author, born at Ilmington, Warwickshire, in 1581, died in London, Sept. 15, 1613. He graduated at Queen's college, Oxford, in 1598. After travelling on the continent, he went in 1601 to Edinburgh, where he became intimate with Robert Carr, afterward Viscount Rochester and earl of Somerset. In 1608 Overbury was knighted. In 1609 he visited France and the Netherlands, and wrote "Observations upon the State of the Seventeen Provinces in 1609" (1626). When he returned, his patron Rochester was engaged in an intrigue with Frances Howard, wife of the earl of Essex; but when it was proposed that she should procure a divorce in order to marry Rochester, Overbury opposed it, and wrote his poem "The Wife" (published in 1614 and frequently reprinted) to dissuade him. Overbury's opposition excited the enmity of the countess, who attempted to procure his assassination; but her uncle, the earl of Northampton, devised that a foreign mission should be offered to him, which Rochester prompted him to refuse. His refusal was declared a contempt of the king's commands, and he was committed to the tower in April, 1613, where he received the harshest treatment, and died within five months. In November Rochester was created earl of Somerset, and in December married the countess of Essex. In May, 1616, the two were arrested for having procured the death of Overbury by poisoning; the countess pleaded guilty and her husband was convicted, and both were sentenced to death, but pardoned; while five minor conspirators, who furnished or admin-

istered the poison, were convicted and executed. A full account of the case from contemporary manuscripts was published in 1846 by Andrew Amos, entitled "The Great Oyer of Poisoning," &c. Overbury's writings, all published posthumously, besides the above mentioned, are: "Characters" and "Newes from any whence, or Old Truths under a supposal of Novelty" (1614); "The First and Second Part of the Remedy of Love," a paraphrase from Ovid (1620); "Miscellaneous Works in Prose and Verse" (1632); and "Crumms fallen from King James's Table, or his Table Talk" (1715). A complete edition of his works, with a life, was published in 1856.

OVERCOMERS. See supplement.

OVERSKOU, Thomas, a Danish dramatist, born in Copenhagen, Oct. 11, 1798. He was apprenticed to a smith in his 14th year, but went upon the stage in 1818. In 1842 he retired with a pension. In 1849 he became manager under the direction of Heiberg, whom he succeeded in 1856, retiring in 1858. His original comedies appeared in 1851-'2, in 5 vols. He adapted many plays from foreign dramatists, and published, besides other writings, an elaborate work on the Danish stage, *Den danske Skueplads* (5 vols., Copenhagen, 1854-'64; supplement, 1865).

OVERTON, a N. county of Tennessee, bordering on Kentucky, drained by Obie's or Obed's river, a branch of the Cumberland, navigable by steamboats for 60 m. in the county; area, 530 sq. m.; pop. in 1870, 11,297, of whom 550 were colored. The surface in some parts is mountainous, and the soil is generally fertile. The chief productions in 1870 were 43,419 bushels of wheat, 394,026 of Indian corn, 69,957 of oats, 18,522 of Irish and 14,514 of sweet potatoes, 121,582 lbs. of butter, 25,585 of wool, and 187,331 of tobacco. There were 3,450 horses, 3,360 milch cows, 1,643 working oxen, 4,977 other cattle, 17,293 sheep, and 29,126 swine. Capital, Livingston.

OVERTURE (Fr. *ouverture*, an opening), a species of introductory symphony prefixed to an opera or oratorio. Its invention is ascribed to the French composer Lully, and in the oldest overtures the fugue, preceded by a slow movement in $\frac{4}{4}$ time and closing in the dominant, was the prominent feature. In this style were written the overtures of Handel and many of his contemporaries. The overtures of modern composers frequently contain snatches of the leading airs of the opera.

OVERWEG, Adolf, a German traveller, born in Hamburg, July 24, 1822, died near Lake Tchad, central Africa, Sept. 27, 1852. He studied at the universities of Bonn and Berlin, and became an accomplished geologist. In the winter of 1849-'50 he joined Barth and Richardson in the English exploring expedition into central Africa, and made many important discoveries, among which was the fact that the desert of Sahara is an elevated plateau, and not, as had been supposed, a depressed plain

For his share in the labors of the expedition, see BARTH, HEINRICH. His reports, from time to time, appeared in the German geographical journals.

OVERYSSEL, or *Overijssel*, an E. province of the Netherlands, bordering on Friesland, Drenthe, Prussia, Gelderland, and the Zuyder Zee; area, 1,282 sq. m.; pop. in 1873, 260,543. The surface is generally low, but diversified by a few small hills locally called mountains, and in the E. part the soil is principally marshy. Large peat moors are found here, and in other places there are sandy heaths. The best land is near the Yssel, which enters the province from Gelderland, forming part of the boundary between the two provinces. The other chief rivers are the Vechte, Schipbeek, Zwarte Water, and Linde. The Zwarte Water and Yssel are united by a canal. The province contains several small lakes. The principal productions are rye, buckwheat, hemp, fruits, cattle, and peat; and the most important manufactures are linen and cotton goods, wicker ware, mats, and iron. The pasture lands are particularly rich, and cattle breeding and peat digging are the most important branches of industry. Considerable attention is also given to the fisheries and to bee keeping. The climate is moist and unhealthy. The chief towns are Zwolle, the capital, Deventer, and Kampen.

OVID (PUBLIUS OVIDIUS NASO), a Roman poet, born at Sulmo in the country of the Peligni, March 20, 43 B. C., died at Tomi on the Euxine, S. of the mouth of the Danube, A. D. 18. He was of an ancient equestrian family, and was educated for the forum; but his taste for poetry interfered so seriously with his professional studies, that the elder Seneca, who had seen one of his rhetorical exercises, describes it as *solutum carmen* rather than an argumentative discourse. His father endeavored in vain to wean him from these tastes, but subsequently allowed him to follow his inclinations. He accordingly finished his education in Athens, travelled in Asia and Sicily, and returned to Rome, where, though it is doubtful if he ever practised the law, he discharged the functions of judge in several of the minor courts, and was finally promoted to be one of the *decemviri* who presided over the court of the *centumviri*. The poets Macer, Propertius, Ponticus, and Bassus were among his intimate friends, and he had frequent opportunities of hearing Horace recite his compositions. He was thrice married, his first wife being quickly put aside for unfaithfulness, and his second because she was irksome to the poet, who was then enamored of a mistress celebrated by him under the name of Corinna. According to Sidonius Apollinaris, this was Julia, the profligate daughter of the emperor Augustus. She was undoubtedly a married woman of high rank, and may be said to have incited Ovid to his first successful attempts at writing in elegiac verse—the series called the *Amores*, published by him in a second edition under the

title of *Amorum Libri III*. At about the age of 30 he married his third wife, with whom he appears to have lived happily, and by whom he had one child, a daughter. His poetical reputation was enhanced by his *Epistolæ Herodii*, his *Ars Amatoria* or *De Arte Amandi* and *Remedia Amoris*, and his tragedy of *Medea*, now lost. In A. D. 8 an imperial edict banished him for life to Tomi, in the country of the Getæ. No reason for this banishment was assigned, beyond his having published his poem on the art of love; but it has been justly supposed that so severe a punishment would not have been inflicted for an offence of this nature, committed ten years before, unless it had been accompanied by another of greater heinousness. The poet himself hints at some "error," which however he never mentions, as the real cause of his punishment. His alleged intrigue with the emperor's daughter Julia has been presumed to be the "error" in question; but she was exiled more than ten years before Ovid. Others have maintained that it was the younger Julia with whom he had an amour; and notwithstanding the disparity in their years, the coincidence of his banishment with hers gives ground for the idea. In the latter part of December Ovid left Rome, and after a journey of nearly a year reached the inhospitable spot to which he was banished. The people among whom his lot was cast were scarcely less rude than their climate; and he never ceased to offer affecting but unavailing supplications for the imperial clemency. Besides applying the finishing touches to his *Fasti*, he wrote during his exile the *Tristia*, a record of his sufferings and appeals for pardon; the letters to his wife and friends *Ex Ponto*, very similar in style and substance to the *Tristia*; and the *Ibis*, a satire. His modest bearing and affable manners won upon the simple inhabitants of Tomi, among whom he rendered himself exceedingly popular by publicly reciting some poems composed in the Getic language, which he had succeeded in mastering. He died in the 10th year of his exile. His chief work, both in bulk and pretensions, was his *Metamorphoses*, in 15 books, composed previous to his exile, and burned by him during the hurry of his departure from Rome, but of which copies had been previously taken by his friends. It is written in heroic verse, and, as the title denotes, includes such legends of mythology as involved a transformation.—Of the numerous complete editions of Ovid, the more remarkable are the *editio princeps* by Azoguidi (2 vols. fol., Bologna, 1471), the Aldine edition (3 vols. 8vo, Venice, 1502), the Elzevir edition by Heinsius (3 vols. 12mo, Leyden, 1629), the Delphin edition (4 vols. 4to, Lyons, 1689), Burmann's, esteemed the best (4 vols. 4to, Amsterdam, 1727), and Burmann's text with Bentley's MS. emendations (5 vols. 8vo, Oxford, 1825). Among editions of his separate works is *P. Ovidii Nasonis Heroides XIV*, edited with a commen-

tary by Arthur Palmer (London, 1873). Of translations of his works nearly every European language possesses an abundance. The most esteemed metrical version of the *Metamorphoses* in English is that "translated by the most eminent hands," including Dryden, Addison, Congreve, Rowe, Gay, Ambrose Phillips, and others (fol., London, 1717), of which many editions have appeared. The version of George Sandys (fol., London, 1626), translated on the banks of James river in Virginia, deserves mention as the first work of any note composed in America. The *Ars Amatoria* and *Heroides* have in like manner been versified by several translators. Sir Thomas Overbury paraphrased the *Remedia Amoris*, and a translation of the *Fasti* by J. Gower was published at Cambridge in 1640. A literal prose translation of all the poems, by H. T. Riley, forms 3 vols. of Bohn's "Classical Library."

OVIEDO, a city of Spain, capital of a province of the same name (see **ASTURIAS**), 15 m. S. W. of the seaport Gijon on the coast of the bay of Biscay, and 230 m. N. W. of Madrid, near the Nalon river and on the Leon railway; pop. about 13,000. It has a cathedral and a large number of monasteries and church establishments, a considerable university with a library of 12,000 volumes, many charitable institutions, and an especially fine hospital. The town is well though irregularly built, contains ten public squares, and has several of the most ancient churches in Spain. A fine aqueduct of freestone, supported on 41 arches, supplies the city with water. The manufactures are few (linens and woollens, hats, arms, &c.), and the trade is insignificant.—According to some authorities, Oviedo was founded by Froila I., grandson of Pelayo, about 760; according to others, it is of more ancient origin. It was the capital of the kingdom of Oviedo till 914, when Ordoño II. transferred his residence to Leon. It was the scene of repeated conflicts during the middle ages; and the church establishments attracted so many prelates to it for refuge, that it became known as the city of the bishops. Later it was for a short time the seat of an archbishopric. It was pillaged by Ney's troops in 1809, and afterward by those of Bonnet and others.

OVIEDO Y VALDES, Gonzalo Fernandez de, a Spanish chronicler, born in Madrid in 1478, died in Valladolid in 1557. He was educated at the court of Ferdinand and Isabella, as one of the pages of Prince Juan. In 1513 he was sent to Santo Domingo as supervisor of gold smeltings, and passed there almost the whole of his subsequent life, holding various offices and occasionally revisiting Spain. Having been appointed historiographer of the Indies, with authority to demand from the Spanish American governors whatever documents he needed, he composed his *Historia general y natural de las Indias Occidentales*, in 50 books, 21 of which were published in Seville in 1535 (translated into Latin, Basel, 1555; German, 1579).

A summary of the work had been published ten years earlier (new ed., Madrid, 1850). This work was denounced by Las Casas as little better than fabulous; but Las Casas was a bitter enemy of the author, whom he accused of rapacity and cruelty in his government. In his 79th year Oviedo finished his valuable work entitled *Las quinquagenas*, in which he gives under the form of dialogues a full, gossiping, and anecdotal account of all the principal persons of Spain of his time. It is still in manuscript in the royal library at Madrid. He also wrote chronicles of Ferdinand and Isabella and Charles V.; and a life of Cardinal Ximenes is attributed to him. His description of Nicaragua forms vol. xv. (*Histoire de Nicaragua*) of H. Ternaux-Compans's *Voyages, relations et mémoires originaux pour servir à l'histoire de la découverte de l'Amérique* (Paris, 1840-'41); and the chief part of his *Historia general* forms vol. iii. of Ramusio's *Delle navigazioni e viaggi* (Venice, 1583, frequently republished).

OWEGO, a town and village, capital of Tioga co., New York, on the Susquehanna river, here crossed by a bridge 240 ft. long, at the mouth of Owego creek, on the Erie and Southern Central railroads, and at the terminus of the Ithaca branch of the Delaware, Lackawanna, and Western railroad, 140 m. S. W. of Albany; pop. of the town in 1870, 9,442; of the village, 4,756. It is surrounded by a fine farming country, with which it has an important trade. The village is pleasantly situated on a level at the base of a high hill, and is handsomely built. The principal streets are bordered by wide sidewalks, and shaded with rows of maples. It contains two grist mills, two founderies, two shoe factories, two soap factories, a piano manufactory, four tanneries, four planing mills, two carriage factories, two marble factories, the Erie railway bridge shops, three banks, six hotels, an academy, six schools, three weekly newspapers, and seven churches. Steamers convey excursion parties to points on the river. Glenmary, on Owego creek near the village, was formerly the residence of N. P. Willis.

OWEN. I. A N. county of Kentucky, bounded W. by the Kentucky river and N. by Eagle creek; area, about 300 sq. m.; pop. in 1870, 14,309, of whom 1,176 were colored. It has an undulating surface and a fertile soil. The Louisville, Cincinnati, and Lexington railroad passes along the N. border. The chief productions in 1870 were 57,248 bushels of wheat, 21,439 of rye, 695,680 of Indian corn, 53,085 of oats, 28,584 of potatoes, 187,200 lbs. of butter, 32,491 of wool, 2,890,670 of tobacco, and 3,857 tons of hay. There were 5,589 horses, 3,074 milch cows, 4,690 other cattle, 11,104 sheep, and 26,399 swine; 1 manufactory of woollen goods, 2 distilleries, and 5 saw mills. Capital, Owenton. **II.** A S. W. county of Indiana, drained by the W. fork of White river and several smaller streams; area, about 400 sq. m.; pop. in 1870, 16,137. Its soil is

fertile, especially near the borders of the streams. It contains extensive and very rich mines of coal and iron ore. The Indianapolis and Vincennes railroad passes through it. The chief productions in 1870 were 202,512 bushels of wheat, 602,098 of Indian corn, 100,216 of oats, 48,064 of potatoes, 168,660 lbs. of butter, 86,612 of wool, and 9,253 tons of hay. There were 5,815 horses, 4,532 milch cows, 8,531 other cattle, 30,285 sheep, and 24,685 swine; 15 manufactories of carriages and wagons, 7 of saddlery and harness, 7 flour mills, and 19 saw mills. Capital, Spencer.

OWEN, John, an English divine, born at Stadham, Oxfordshire, in 1616, died at Ealing, near London, Aug. 24, 1683. At the age of 12 he was entered at Queen's college, Oxford, receiving his bachelor's degree at 16, and his master's degree at 19. The lead which he took in resisting Archbishop Laud's new academical regulations brought upon him the ill will of the high church party; and the support of an uncle being withdrawn, he was compelled to leave his place at Oxford, to accept orders in the church, and to support himself by private teaching and by officiating as chaplain. His mind was greatly exercised by doubts concerning his religious state and his duty in national affairs, which resulted finally in his open adhesion to the side of the parliament against the king. The type of faith which he chose was strict Calvinism, and his first work was the "Display of Arminianism" (1642). In reward for it he received from the committee of parliament the living of Fordham in Essex, where he gained fame as a pulpit orator. This was increased when he removed to Coggeshall; and his change while here from the Presbyterian to the Independent form of church government only made him more popular. In April, 1646, he was first called to preach before the parliament, and he had the dangerous honor of addressing them on the day after the execution of Charles I. Cromwell favored him, took him as private chaplain on his expeditions to Ireland and Scotland, and, when he had received the office of dean in Christchurch college, made him in addition vice chancellor of the university. The five years in which he held this office were years of great activity; he preached constantly and published several of his most important works, receiving in 1653 the degree of D.D. After the death of Cromwell Presbyterian opposition deprived him of his offices, and at the restoration he retired to his native town; but he persevered in addressing assemblies and in expounding the principles of that Savoy confession which he had assisted in preparing. While in Newtown he published a work entitled *Fiat Lux*, which attracted the notice of Lord Clarendon, who offered him immediate preferment if he would conform; but he refused. From 1667 to 1670 he took charge of a congregation in Leadenhall street, London, where his eloquence secured the favor of many

of the nobility, and even for a time of the king and his Catholic brother; and he had repeated interviews with Charles II. The last 12 years of his life were a period of weakness and pain. His work on "The Glory of Christ" was hardly prepared for the press when he died. Owen's works are voluminous and on many subjects. There were 7 volumes in folio, 20 in quarto, and 30 in octavo. A complete edition was edited by Thomas Russell, with a life by William Orme (21 vols., London, 1826). There is also an edition published in Edinburgh (24 vols. 8vo, 1859).

OWEN, Richard, a British anatomist, born in Lancaster in 1804. He was for some years a pupil of a surgeon in Lancaster, and in 1824 he attended medical lectures at Edinburgh, acquiring a predilection for the study of comparative anatomy. In 1825 he went to London, became a student at St. Bartholomew's hospital, and was employed by Abernethy as prospector. In 1826 he became a member of the royal college of surgeons, and shortly after by the assistance of Abernethy was appointed assistant curator of the Hunterian museum. No catalogue of this collection existed, and Owen prepared in conjunction with Mr. Clift the catalogue of the pathological specimens (2 vols. 4to, 1830), and that of the monsters and malformations (4to, 1831), both comprising descriptions of the specimens. Between 1833 and 1840 Owen produced the elaborate "Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy" (5 vols. 4to). In order to identify the Hunterian preparations, it was necessary to make new dissections for comparison; and while engaged in this occupation he was constantly opening new paths of inquiry and making discoveries. The materials and suggestions thus acquired have been employed to illustrate four great departments of natural science, viz.: comparative anatomy and physiology, zoölogy, palæontology, and transcendental anatomy and physiology. As an anatomist he has extended his labors over the four divisions of the animal kingdom, giving more attention to the vertebrates, and particularly to its chief division, the mammalia, than to either of the others. Among his papers on the mammalia, those devoted to the quadrumana, the carnivora, and the marsupialia are the fullest and most important. His researches among the birds, reptiles, and fishes, both with respect to their classification and their connection with extinct species, have been not less remarkable; and in connection with this branch of his labors he has opened a rich field of inquiry among the extinct birds of New Zealand, resulting in the discovery of the gigantic genus *dinornis*, with many of its species, and several kindred genera. His "Memoir on the Pearly Nautilus," published in 1832, containing a description of its anatomy, and a proposal for a new classification of the family of cephalopodous mollusks, was followed by an important series of papers

on the same subject. In these investigations he made frequent use of the microscope, and was one of the founders and the first president of the microscopical society. His microscopical investigations of the structure of the teeth of animals led him in 1849 to divide the mammalia into two classes, the monophyodonts, or those generating a single set of teeth, and the diphyodonts, which generate two sets. The most important results of these researches were embodied in his "Odontography" (2 vols. 8vo, London, 1840-'45). In the department of palæontology he reconstructed numerous extinct families of vertebrata, the existence of which had not previously been even surmised. His publications in this department comprise, besides shorter papers, a "History of British Fossil Mammals and Birds" (8vo, 1846); a "Description of the Skeleton of an extinct gigantic Sloth (*Mylogodon robustus*), with Observations on the Osteology, Natural Affinities, and Probable Habits of the Megatheroid Animals in General" (4to, 1842); and a "History of the British Fossil Reptiles" (4to, 1848-'55). In the department of transcendental anatomy, Mr. Owen was the first to develop the idea of Oken, that the typical form of the skeleton in the higher animals is the vertebra, publishing works "On the Archetype and Homologies of the Vertebrate Skeleton, with Tables of the Synonymes of the Vertebral Elements and Bones of the Head of Fishes, Reptiles, Birds, Mammals, and Man" (1848), and "On the Nature of Limbs" (1849). Among his other writings is a work "On Parthenogenesis" (1849). In 1836 Mr. Owen was appointed Hunterian professor at the royal college of surgeons, in place of Sir Charles Bell. His lectures here were published under the title of "Lectures on Comparative Anatomy" (2d ed., 1853). In 1856 he was appointed chief of the natural history department of the British museum, which post he still holds (1875), giving in connection with it annual courses of lectures on natural history. He is also distinguished for his successful efforts toward improving the sanitary condition of large towns. He has received the royal and Copley medals, and various honors from seats of learning, and is a member of the chief scientific bodies of the world. His latest important work is "On the Anatomy of the Vertebrates" (3 vols., 1866-'8).

OWEN. I. Robert, an English social reformer, born in Newtown, North Wales, March 14, 1771, died there, Nov. 19, 1858. The son of poor parents, when 14 years old he procured a situation in London, and at the age of 18 became partner in a cotton mill. He married in 1799 the daughter of David Dale, a Glasgow manufacturer, having previously, with other partners, bought from Mr. Dale the village and cotton mills of New Lanark, Scotland. Here he introduced a system of reform which proved for a time highly successful. In 1812 he published "New Views of Society, or Essays upon the Formation of Human Character," and sub-

sequently a "Book of the New Moral World," and various other works, in which he maintained a theory of modified communism, insisting on an absolute equality in all rights and duties, and the abolition of all superiority, including alike that of capital and that of birth. By the aid of his immense fortune he was enabled to distribute a large number of tracts developing his peculiar views, and soon had everywhere numerous and enthusiastic followers, but was attacked on all sides, and particularly by the religious press. He set out in 1823, after the death of his patron, the duke of Kent, for the United States, where he determined to found at his own cost a communist society; and with this view he bought from Rapp the settlement of New Harmony in Indiana, on the banks of the Wabash, embracing 20,000 acres of land and dwellings for 1,000 persons. The scheme, however, proved an utter failure, and in 1827 he returned to Great Britain, where experiments of a similar nature attended by a similar result were made at Orbiston in Lanarkshire, and at Tytherley in Hampshire. He succeeded no better in establishing a "labor exchange" in London, in connection with a bazaar and bank. In 1828 he went to Mexico on the invitation of the government to carry out his experiment there, but effected nothing. He however continued for the rest of his life to advocate his views both as a writer and public speaker, revisiting America several times. His ideas are clearly developed in his "Lectures on a New State of Society," "Essays on the Formation of Human Character," and "Outline of the Rational System," and especially in his principal work, "The Book of the New Moral World," in which he came forward as the founder of a system of religion and society according to reason. During his last years he was a believer in spiritualism, through which he became convinced of the immortality of the soul. **II. Robert Dale**, an American author, son of the preceding, born in Glasgow, Scotland, Nov. 7, 1801, died at Lake George, N. Y., June 24, 1877. His early years were spent at New Lanark. In 1818 he was sent to Fellenberg's school at Hofwyl, Switzerland, where he remained upward of three years. He accompanied his father to the United States in November, 1823, lived for some time at New Harmony, and in the autumn of 1828 commenced at New York, in partnership with Miss Frances Wright, a weekly paper called "The Free Enquirer," which was continued for three years. He then removed to New Harmony, where he was three times (1835-'8) elected a member of the Indiana legislature. In 1843 and 1845 he was elected to congress as a democrat, serving till 1847. He took a leading part in settling the N. W. boundary dispute. In 1845 he introduced the bill organizing the Smithsonian institution, and in 1846 became one of its regents and chairman of its building committee. In 1850 he was elected a member of the convention which amended the constitution of Indiana,

and became chairman of its revision committee. In that convention, and afterward in the legislature, he introduced measures securing to the women of Indiana independent rights of property. In 1853 he was appointed chargé d'affaires at Naples, and in 1855 minister, remaining there till 1858. In the spring of 1860 he had a discussion on divorce with Horace Greeley, which appeared originally in the "Tribune," and afterward in a pamphlet, which obtained a circulation of 60,000 copies. During the civil war he published various letters to members of the cabinet and to the president, advocating the policy of emancipating the slaves. In 1863 he published an address to the citizens of Indiana, showing the disastrous consequences that would follow from the success of the effort then making by certain politicians to reconstruct the Union with New England left out. Of this address the Union league of New York published 50,000 copies, and the Philadelphia Union league 25,000 copies. He was for many years a prominent believer in the phenomena called spiritualism. His principal works are: "An Outline of the System of Education at New Lanark" (Glasgow, 1824); "Moral Physiology" (New York, 1831); "Discussion with Origen Bachelor on the Personality of God and the Authenticity of the Bible" (1832); "Pocahontas," a historical drama (1837); "Hints on Public Architecture," with 113 illustrations (1849); "Footfalls on the Boundary of Another World" (Philadelphia, 1860); "The Wrong of Slavery and the Right of Emancipation" (1864); "Beyond the Breakers," a novel (1870); "The Debatable Land between this World and the Next" (New York, 1872); and "Threading My Way," being 27 years of autobiography (1874). His "Footfalls" treats of the spontaneous phenomena of spiritualism, and "The Debatable Land" opens with an address to the Protestant clergy on the present attitude of the religious world, while the body of the work sets forth the evidences of spiritual phenomena in general. **III.**

David Dale, an American geologist, brother of the preceding, born in Lanarkshire, Scotland, June 24, 1807, died in New Harmony, Ind., Nov. 13, 1860. He was educated with his brother at Hofwyl, and in 1825 accompanied his father to New Harmony. He afterward passed two years in studying geology and other branches of natural science in Europe, and in 1833 took up his permanent residence in the United States. In 1837 he was employed by the legislature of Indiana to make a geological reconnaissance of the state, the results of which were published in a small work (new ed., 1859). He subsequently, under instructions from the general land office, made a minute examination of the mineral lands of Iowa; and in 1848 he was employed by the government to conduct the geological survey of Wisconsin, Iowa, and Minnesota. The result of three years' labor in this extensive field was in 1852 published by congress in a 4to

volume, accompanied by numerous maps and illustrations. From 1852 to 1857 he conducted the survey of Kentucky, the report of which appeared in four volumes and an atlas (Frankfort, 1856-'61). In 1857 he was appointed state geologist of Arkansas, and the report of his survey was published in 1858-'60. He also conducted various important examinations for individuals and corporations.

OWEN, William, an English painter, born in Ludlow, Shropshire, in 1769, died in London, Feb. 11, 1825. He was instructed in painting by Catton and Sir Joshua Reynolds, and in 1792 exhibited at Somerset house a portrait and a landscape. He painted the portraits of some of the most celebrated men of his day, including William Pitt and Lord Grenville. In 1806 he became a royal academician. He declined the honor of knighthood as an expensive distinction. Among his works were some fancy pieces, including "The Daughter of the Beggar of Bethnal Green," "The Sleeping Girl," "The Children in the Wood," &c.

OWEN SOUND, a town, port of entry, and the capital of Grey co., Ontario, Canada, at the outlet of the river Sydenham into Owen sound, and at the terminus of a branch of the Toronto, Grey, and Bruce railway, 123 m. by rail N. W. of Toronto; pop. in 1871, 3,369. It is pleasantly situated on a small plain surrounded on three sides by wooded heights, and contains a commodious town hall, court house, a number of stores, hotels, and churches. The sound, which is the best harbor on Lake Huron, admits the largest class of lake vessels. It is 12 m. from the town to its mouth in Georgian bay, where it is 5 m. wide. A large number of vessels are engaged in the grain and lumber trade. There are manufactories of mill machinery, turbine water wheels, agricultural implements, engines, sewing machines, leather, wooden ware, and woollens, two breweries, flour and saw mills, five large grain warehouses and elevators, and three weekly newspapers.

OWL, the general name of the nocturnal birds of prey constituting the family of *strigidae*, of which there are 5 subfamilies, 13 genera, and about 150 species, more than 40 of which inhabit America. Owls may be recognized by their short and bulky form, with head disproportionately large, fully feathered, and often furnished with erectile tufts like the ears of quadrupeds; the eyes are very large, directed forward, more or less surrounded by a disk of radiating bristly feathers, and in most formed for seeing in twilight or at night, presenting a vacant stare when exposed to daylight; lores densely covered with bristly feathers directed forward, nearly concealing the short, strong, and hooked bill; ears large, with a kind of operculum or cover, enabling them to hear slight noises in the stillness of night; the wings are generally moderate, broad, and rounded, the outer edge of the primaries with separated barbs, adapted for vigorous and noiseless but not rapid flight in pursuit of liv-

ing prey in morning and evening twilight; the tail broad, and of various lengths; tarsi usually short, strong, feathered to the toes except in the Asiatic genus *ketupa*; the inner toe the longest, and the outer capable of being turned back as in scansorial birds; the claws long, curved, and very acute. The plumage is soft and downy; the female is the larger, resembling the male in colors; the expression of the face and eyes is cat-like; the eggs are two to five, and white, and the young are covered with a fine down. The mouth is very wide, and the oesophagus capacious, leading directly to the stomach, without any dilatation or crop; the intestines are short, and with two large cæca. Owls are solitary birds, retiring during the day to holes in trees, caves, or old buildings, where they roost and breed; most are nocturnal, but a few fly by day, in habits resembling the *falconidae*, especially the kites; the larger species feed on small quadrupeds (particularly mice) and birds, and the smaller on insects, such as moths and large beetles; if the prey be small, it is swallowed whole, or is torn to pieces if necessary, and the indigestible portions, such as feathers, hair, and bones, are disgorged from the stomach in small pellets. They are great benefactors to man by destroying mice and other noxious animals; but from their nocturnal habits and dismal screeching cry they are generally regarded with superstitious fear. In the Scriptures the owl is almost always associated with desolation; painters, poets, and story tellers introduce it as a bird of ill omen, and as the companion of ghosts, witches, demons, and magicians; almost all uncultivated nations look upon it as an unwelcome visitor; the ancient Greeks and Romans, however, made it the emblem of wisdom, and sacred to Minerva, and indeed its large head and solemn eyes give it an air of wisdom, which its brain does not sanction.—In the first subfamily, the *striginae*, the size is never very large; the head is smooth and bulky, and the facial disk perfect; the bill rather long, eyes rather small, legs long and feathered to the toes. In the genus *strix* (Linn.) belong the barn owls; in this the wings are long, and the head without tufts; of the dozen species scattered over the world will be mentioned only two. The American barn owl (*S. pratincola*, Bonap.) is 18 in. long, with an extent of wings of $3\frac{3}{4}$ ft. in the female; the male is an inch shorter and 2 in. less in extent. The general color above is yellowish or grayish brown, finely mottled with light yellowish red, each feather having toward the end a central deep brown streak ending in a grayish white spot; quills and tail transversely banded with blackish brown; under coverts of wings and tail white; under parts pale brownish red, fading anteriorly into white, each feather tipped with a dark brown spot; the face white, tinged with red, with a ruff of light brownish red; the bill, toes, and claws light yellowish. It

breeds at all seasons in the southern states; it is not found far from the sea, and frequents the borders of woods and open abandoned fields; it feeds almost entirely on quadrupeds,



American Barn Owl (*Strix pratincola*).

and sometimes digs up moles and mice like the burrowing owl; its flight is light, regular, and protracted, and it runs rapidly; according to Audubon it makes no cry, but utters a hollow hissing sound. The European barn owl (*S. flammea*, Linn.) is considerably smaller than the American, being only 14 in. in length and 3 ft. in extent of wings; it is lighter colored, more yellowish, with gray and brown zigzag lines and whitish dots above; it is whitish below, and the ruff is white. It is found abundantly in Great Britain and other temperate parts of Europe, in Asia, and in Africa, especially in cultivated districts in the neighborhood of fields and farm yards where it can find a plentiful supply of mice; though a single bird will destroy annually several hundred mice and moles, besides noxious insects, it is constantly persecuted for its alleged injury to game birds and the dove cote; it sometimes captures fish by dropping upon them in the water; its general note is a screech, hence it is commonly called screech owl in Great Britain; it rears several broods in a season between July and December.—In the second subfamily, the *buboninae*, the facial disk is incomplete above the eyes and bill, and the large, broad, and flat head is furnished with a pair of long erectile ear tufts, which have given them the name of horned owls; legs and claws usually very strong. This subfamily is spread all over the world, except in Australia, and contains some of the largest as well as some of the smallest of the family. The genus *bubo* (Cuv.) is of large size and robust form; the large eyes and ear tufts have given them the name of cat owls; the wings are long, the tail short, the legs densely feathered, the bill short, and the claws very strong. The American great horned owl (*B. virginianus*, Bonap.) is from 20

to 25 in. long, with an extent of wings of $4\frac{1}{2}$ to 5 ft., the bill along the ridge 2 in., and the ear tufts 3; the color is variable from dark brown to nearly white; the general color above is dark brown, every feather mottled with irregular lines of pale ash and reddish fulvous, the base of each being of the latter color; throat and neck white, breast with longitudinal black stripes, rest of under parts mixed white and fulvous with narrow transverse dark brown lines; iris yellow, bill and claws bluish black. It is found throughout North America, and probably also in South America, several varieties being described in different latitudes, in mountain and plain, on the seashore and in the interior; the flight is elevated, rapid, and graceful; it makes a great variety of sounds, barking like a dog, hallooing and leading astray the benighted traveller, saluting him by notes like the half suppressed screams and gurglings of a suffocating person, or deceiving him by a low "hoo-hoo-hoo-e" which seems a great distance off. It commits great havoc in the farm yard, seizing all kinds of domestic poultry, to which may be added grouse, ducks, hares, squirrels, and opossums, and even dead fish. They begin to pair in February, making a bulky nest usually on a large horizontal branch, and rear only one

(Blas.), is characterized by small size, conspicuous ear tufts and large head, and long tarsi more or less covered with short feathers. The mottled or American screech owl (*S. asio*,



American Screech Owl (*Scops asio*).

Bonap.) is about 10 in. long and 22 in extent of wings; in the adults the plumage above is pale ashy brown with longitudinal brownish black lines, mottled with the same and cinereous, and below ashy white with similar stripes and lines; bill and claws horn color; in young birds the upper parts are pale brownish red, in some parts rufous, and below yellowish gray, hence called the red owl. This is the most abundant owl in the Atlantic states, and is found over the whole of temperate North America, and even as far as Greenland; its food consists principally of beetles and field mice, which it seeks in the neighborhood of farm houses, orchards, and gardens, where it is rarely molested; its notes are mournful and tremulous, like the chattering of teeth, but loud enough to be heard for several hundred yards. The little horned owl of Europe (*S. Aldrovandi*, Ray) is about 8 in. long, of a light gray color variegated with brown, with longitudinal brownish black lines and transverse undulations; it is most abundant in southern Europe in wooded districts, where it feeds on insects and mice; it is also found in N. Africa and Asia, and rarely in Great Britain; it nestles in cavities in rocks and holes in trees, laying two to four eggs; it is gentle, and readily tamed; its notes are plaintive and monotonous, resembling "keu, keu," and are kept up regularly the night long. In the genus *otus* (Cuv.) the form is larger and more slender, the head moderate with more perfect facial disk, and the eyes rather small. The American long-eared owl (*O. Wilsonianus*, Less.) is about 15 in. long, with an extent of wings of $3\frac{1}{2}$ ft.; it is rather a handsome bird, very intricately marked, and may be generally described as of a buff color, mottled and spotted with brown and grayish white; it inhabits the whole of temperate North America, and even the shores of Hudson bay; it is strictly noc-



American Great Horned Owl (*Bubo Virginianus*).

brood of three to six in a season. It is a bold and powerful bird, bravely resisting when attacked. The European horned or eagle owl (*B. maximus*, Sibb.), *le grand duc* of the French, is about 26 in. long, with an extent of wings of 5 ft.; it is common in the forests of Europe from the Mediterranean to Norway and Lapland, but is rare in Great Britain; it occurs also in Asia; its habits are the same as those of the American bird; the general color is ferruginous, varied with spots and markings of brown, black, and gray; in captivity it is fierce, hissing, snapping, and barking when irritated, but making no other noises. The genus *scops* (Sav.), or *ephialtes* (Keys. and

turnal, preying upon insects and small mammals and birds; it deposits its eggs in the abandoned nest of other birds, in a fissure of a rock, a hole in a tree, or a hollow in the



American Long-eared Owl (*Otus Wilsonianus*).

ground; its cry is plaintive, consisting of two or three prolonged notes repeated at intervals. The European long-eared owl (*O. vulgaris*, Flem.) bears a strong resemblance to the American species, and is one of the most abundant of the family in England, where it remains all the year round; it is intricately dappled with dark brown and black upon pale brown, and is a very handsome bird; it frequents old ivy-covered towers and trees, where it remains during the day; it rarely makes a nest of its own, using those of the crow or squirrel. The American short-eared owl has been made, with others, into the genus *brachyotus* (Gould), characterized by inconspicuous ear tufts; this species (*B. Cassini*, Brewer) is about 15 in. long, with an extent of wings of $3\frac{1}{2}$ ft.; the plumage is reddish buff, streaked longitudinally with dark brown, the tail being of the latter color barred and tipped with reddish buff; it is found in North America from Greenland to Cuba and from the Atlantic to the Pacific, in the eastern states in the winter preferring the vicinity of marshes and meadows; it is very fond of remaining on the ground, on which it advances by long leaps. The European short-eared owl (*B. palustris*, Gould), 16 in. long and 40 in alar extent, much resembles the preceding species; it seeks its food by day, even in full sunlight, pursuing pigeons and domestic fowls into the farm yard, though feeding chiefly upon mice. In the Asiatic genus *ketupa* (Lesson) the long tarsi are covered with scales instead of feathers; the *K. flavipes* (Hodgs.) is somewhat diurnal, and plunges into streams in pursuit of fish and crabs.—In the third subfamily, the *syrrinae* or gray owls, the head is large, with very small and concealed or no ear tufts; the facial disk nearly perfect, eyes small, wings rather short, and tarsi and toes generally fully feathered.

Though this subfamily contains some of the largest owls, the size is usually moderate and sometimes even small. In the genus *syrrnium* (Sav.), characterized by large size, and long, wide, and rounded tail, belongs the great gray owl (*S. cinereum*, Aud.), the largest in North America, and one of the largest of the family, about 30 in. long, with an alar extent of 4 ft.; the prevailing color is ashy brown above mottled and barred with ashy white, the under parts of the latter color, with longitudinal brown stripes on the breast, and transverse ones of the same on the abdomen; quills and tail brown, with five wide bands of ashy white; bill yellow. It is found in North America from New Jersey to Hudson bay; is rather diurnal in habit, frequenting wooded districts, and preying on hares and other rodents; its cry resembles that of the mottled owl. The barred owl (*S. nebulosum*, Gray) is about 20 in. long and 40 in alar extent; the bill is yellow; the general color above is light reddish brown, largely spotted with white on the back and wing coverts; wings and tail tipped with



Barred Owl (*Syrrnium nebulosum*).

grayish white; below pale brownish red, marked on the neck and upper breast with transverse and below this with longitudinal brown streaks; abdomen yellowish white; plumage, as in the preceding species, remarkably soft and downy. It is found in North America east of the Mississippi, especially in the southern states, in retired woods, even in the daytime; its loud discordant cry of "whah, whah, whah-aa," frequently repeated at evening twilight, has a ludicrous sound, compared by Audubon to the affected laugh of some fashionable people; its odd and lively movements entitle it to the name of the "buffoon of the woods." It preys on half-grown chickens, young hares and rabbits, squirrels, mice, small birds, and frogs; it begins to lay in the middle of March in a hollow tree, and raises a single brood in a season; in captivity it makes an excellent mouser; as it often appears in the daytime, it

is specially liable to the attacks of diurnal birds, which have a natural antipathy to the whole family; its flesh is sometimes exposed for sale in the markets of New Orleans, and is considered palatable by the negroes. The hooting or tawny owl of Europe (*S. aluco*, Linn.) is about 15 in. long and 34 in alar extent; the upper parts are brownish red, tinged with gray, with longitudinal dark brown streaks and transverse lighter lines, and lower parts reddish or yellowish white with similar markings; large white spots on wing coverts; its cry is very doleful, like "hoo, hoo, hoo," or the howling of a wolf; it is strictly nocturnal, inhabiting thick woods, preying on the usual animals and birds, and sometimes seizing fish in the water. In the genus *nyctale* (Brehm) the size is small, with very small ear tufts, facial disk nearly perfect, wings long, tail short, and legs and toes densely feathered. Here belongs the little Acadian owl or saw-whet (*N. Acadica*, Bonap.), about 8 in. long and 18 in alar extent; the upper parts are olivaceous brown, the back of neck, rump, and scapulars spotted with white; face and under parts ashy white, the latter with pale brown streaks; quills and tail brown, spotted with white; bill and claws dark. This is the smallest owl found in the eastern and middle states, and probably occurs over the whole of temperate North America. This lively and handsome owl is called "saw-whet," as its love notes much resemble the noise made by filing the teeth of a saw, often leading the inexperienced traveller to expect to find a sheltering saw mill in the depths of the forest; it is sometimes also called screech owl in the middle states; it is not unfrequently caught in large cities, and is nocturnal in its habits; its usual cry resembles that of the little horned owl of Europe.—The fourth subfamily, *Atheninæ* or

has rather long wings, short bill and tail, long tarsi, and naked toes, and contains the burrowing owls. The American burrowing owls, *A. (S.) cunicularia* and *A. (S.) hypogæa* (Bonap.), occupy respectively the country west of the Rocky mountains and that portion between these and the Mississippi river; the former may be distinguished from the latter by its rather larger size and the feathering of the tarsus uninterrupted to the toes; the plumage is light ashy brown above, with numerous large white spots; breast light brown, white-spotted; abdomen yellowish white with brown spots; the length is from $9\frac{1}{2}$ to $10\frac{1}{2}$ in. They are found in considerable numbers on the plains in the Rocky mountains, inhabiting the burrows of the prairie squirrels and other rodents, to which they flee when alarmed, and in which they live and bring up their young; they are strictly diurnal, and feed on grasshoppers, crickets, and field mice; in other parts of the world they dig their own burrows. There are several species in India, where they sometimes make loud and continual noises.



Snowy Owl (*Nyctea nivea*).

—The fifth subfamily is the *nycteininæ* or day owls, characterized by compact form, moderate head without tufts, rather long wings and tail, and strong and densely plumed tarsi; it embraces only two genera, each with a single species, inhabiting the arctic regions of both hemispheres, migrating southward in winter. In the genus *nyctea* (Steph.) the size is large, the head has no facial disk, and the legs and bill are rather short. The snowy owl (*N. nivea*) is from 21 to 27 in. long, with an alar extent of $4\frac{1}{2}$ to $5\frac{1}{2}$ ft., and a weight of 4 to 5 lbs., according to sex; the general color is white, with the upper part of head and back with lunated dark brown spots, and the breast, sides, and thigh coverts with curved lines of the same; wings and their coverts and tail barred with oblong brown spots; some specimens, probably old birds, are almost entirely white. It is found in the northern regions of



American Burrowing Owl (*Athene cunicularia*).

bird owls, are small, with very imperfect facial disk, head without ear tufts, and tarsi thinly covered with feathers; rather diurnal in habit. The genus *Athene* (Boie) or *speotyto* (Glog.)

America, Europe, and Asia, coming within the United States as far as Georgia in the winter; it hunts in the daytime and at morning and evening twilight; of rapid and powerful flight, it strikes ducks, grouse, pigeons, &c., on the wing like a falcon, and seizes hares, squirrels, and rats from the ground, and fish from the shallows; from its color it is seen with difficulty amid the rocks and snow in its favorite haunts. In the genus *urnia* (Dum.) the form is stout, but larger and more hawk-like; the wings and tail are long, and the legs rather short. The hawk or day owl (*S. ulula*, Bonap.) is 16 to 17 in. long, with an alar extent of 33; the upper parts are sooty brown, with white spots on the shoulders; throat white, with dark brown stripes; brown spot on each side of breast; beneath with transverse lines of pale ashy brown; quills and tail brown, with numerous white bands; bill pale yellow. It is found in the northern regions of both hemispheres, in this country rarely going as far south



Hawk Owl (*Surnia ulula*).

as Pennsylvania; it is common in the fur countries, where it is often seen hunting by day, approaching the camps with great boldness. In summer it feeds on squirrels, mice, and insects, and in winter principally on the ptarmigan and grouse. This bird approximates to the falcons in its bold and diurnal habits, and in the absence of facial disk and ear tufts, smaller size of the head, smaller eyes, and less developed ears; its eyes are adapted for the dim light of snow-clad and arctic regions.

OWL PARROT, a singular bird of the cockatoo family, of the genus *strigops* (Gray), found in New Zealand. In the only species described (*S. habroptilus*, Gray), the bill is high and short, grooved on the sides, with much curved culmen, acute tip, dentated lateral margins, and base covered by hair-like feathers; the wings are short and rounded, the fifth and sixth quills equal and longest; tail moderate, weak, much rounded, and each feather pointed with the

shaft projecting; tarsi short and robust, covered with rounded scales; claws long, strong, and slightly curved. This is the *kakapo* or night parrot of the natives; it is about 2½ ft.



Owl Parrot (*Strigops habroptilus*).

in length, of a dirty green color, with black transverse bands and brownish and yellowish spots; bill yellowish white. It has the general form of a parrot, with the facial expression, nocturnal habits, and noiseless flight of the owls; it lives in holes which it digs in the ground at the roots of trees; it is solitary, rarely seen, preferring moist and dark woods, and keeps chiefly on the ground, where its tracks are said to resemble those made by the human foot; its food consists of the roots of ferns and the outer covering of the New Zealand flax (*phormium tenax*); it breeds in February, laying two or three eggs; the voice is a hoarse croak. According to the natives, these birds assemble in the winter in caves in large numbers, dispersing again in the spring with a great noise; their flesh is white and is considered good eating. For an account of its habits see "Proceedings of the Zoological Society of London" (1852).

OWOSSO, a city of Shiawassee co., Michigan, on the Shiawassee river, at the junction of the Detroit and Milwaukee and the Jackson, Lansing, and Saginaw railroads, 75 m. N. W. of Detroit, and 25 m. N. E. of Lansing; pop. in 1870, 2,065; in 1874, 2,448. It is handsomely laid out, with streets crossing each other at right angles, and contains some fine residences. There are a saw mill, two grist mills, a plaster mill, two foundries and machine shops, two planing mills, an axe-helve factory, a chair factory, two cabinet factories, a brewery, a pump factory, a boot and shoe factory, a tile factory, four carriage and wagon factories, two brick yards, a marble yard, two wheat elevators, and a national bank. The city contains a mineral spring and bathing house, six hotels, a union school house costing \$46,000, two weekly news-

papers, and eight churches. Owosso was settled in 1835 and incorporated in 1859.

OWSLEY, an E. county of Kentucky, intersected by the S. fork of the Kentucky river; area, about 460 sq. m.; pop. in 1870, 3,889, of whom 75 were colored. It has a hilly and very broken surface, and a not very fertile soil. There are extensive forests and rich iron and coal mines. The chief productions in 1870 were 8,398 bushels of wheat, 103,055 of Indian corn, 20,072 of oats, and 42,073 lbs. of butter. There were 796 horses, 1,119 milch cows, 1,926 other cattle, 4,139 sheep, and 6,289 swine. Capital, Booneville.

OWYHEE, the S. W. county of Idaho, bounded N. by Snake river, S. by Utah and Nevada, and W. by Oregon; area, 13,600 sq. m.; pop. in 1870, 1,713, of whom 368 were Chinese. It is watered by the Bruneau and numerous other affluents of the Snake. The surface is uneven and mountainous, the county containing the Owyhee range. It is in parts heavily timbered, is well adapted to grazing, and contains some valuable farming land. The Bruneau valley is well sheltered, has excellent pasturage, and is a common wintering place of cattle. This county is one of the richest mining regions in the territory, and in 1870, according to the United States census, 5 gold (placer) and 9 gold and silver (quartz) mines were in operation. The agricultural productions were small. The value of live stock was \$55,075. Capital, Silver City.

OX, a general name for bovine animals of all kinds, though primarily signifying only the male. The family *bovinæ* contains the genera *bos*, *ovibos* (musk ox), *bubalus* (buffalo), *bibos*, *bison*, and *poëphagus* (yak). The general characters of the family are given under **CATTLE**



Skull of the Ox.

and **RUMINANTIA**, and many of the species are treated in the articles **AUROCHS**, **BISON**, **BUFFALO**, **YAK**, and **ZEBU**. The old genus *bos* has been variously subdivided by authors, accord-

ing to the structure of the hoofs, muzzle, direction and structure of the horns, the position of the knee, and the beard in the males. The domestic ox has been so modified by man, that it is impossible to draw any distinction between the permanent varieties and species. There is no animal more useful to mankind than the ox, its flesh and milk serving for food, its living strength being utilized in agriculture and transportation, and almost every part of the dead body employed for some important purpose in the arts. The principal characters are: horns curving outward and upward, broad and naked muzzle, wide space between the nostrils, large ears, long tufted tail, and broad hoofs. They are found all the world over, except in Australia, in a wild state. Fossil oxen have been found as early as the middle tertiary epoch both in America and the old world. It is probable that the aurochs, a contemporary of the extinct *elephas primigenius*, would long ago have been exterminated but for the protection of man; the *bos primigenius* of the post-tertiary, according to Dana, is supposed to be the same as the ure ox *B. urus* described by Caesar, and said to abound in the forests of Gaul—a distinct species from the aurochs, now extinct, but living in Switzerland into the 16th century. Extinct members of the genus *bos* and other allied genera have been described by Profs. Leidy, Cope, Marsh, and others in the "Smithsonian Contributions," the "Proceedings and Journal of the Academy of Natural Sciences," and the "American Journal of Science."

OXALIC ACID, an important and powerful acid discovered by Scheele in 1776, or as claimed by some by Bergman; symbol, $H_2C_2O_4$, $2H_2O$; chemical equivalent, 126. It occurs in vegetables, animals, and rarely in minerals, as in the form of sesquioxalate of iron in humboldtite. Of the juices of plants it is a frequent constituent. Its name is derived from its giving to the leaves of the wood sorrel (*oxalis acetosella*) their very acid taste. In this and in the common sorrel (*rumex acetosa*) it occurs combined with potash as binoxalate of potash. Combined with lime, it gives solidity to many lichens, and is found in the roots of rhubarb, valerian, and other plants. It is found in a free state in the bristles of the chick pea (*cicer arietinum*). It is artificially produced by the oxidation of sugar or of starch by nitric acid. Schlesinger's method, recommended by Berzelius, is to dissolve one part of dry loaf sugar in $8\frac{1}{2}$ parts of nitric acid of specific gravity 1.38, and heat in a flask till effervescence, caused by the escape of carbonic acid and nitric oxide, ceases. The solution is then evaporated by a water bath to one sixth of its bulk, and the acid crystallizes on cooling. The product varies greatly in quantity according to the manner in which the nitric acid is applied. The crystals are colorless transparent prisms of four or six sides. They have a very sour taste, and dissolve in nine parts of cold or about one part of boiling water. In a very dry atmosphere they

effloresce slightly, and gently heated they become opaque, and lose two atoms (28.5 per cent.) of water, their composition then being $\text{H}_2\text{C}_2\text{O}_4$. The crystals may crumble to powder, and even be almost wholly sublimed, without decomposition; but the other atom of water is expelled only at a decomposing heat, when the compound is converted into carbonic and formic acids and carbonic oxide. If the whole of the water be abstracted by treatment with strong sulphuric acid, the elements of dry oxalic acid are instantly resolved into equal volumes of carbonic acid and carbonic oxide. Two salts of oxalic acid are of especial importance, the binoxalate of potash and oxalate of lime. The former, known as salt of sorrel, sometimes improperly called salt of lemons, is used to remove ink stains from linen, which it does by forming a soluble double salt of potassium and the metal whose oxide or compound produces the stain. For lime oxalic acid has a very strong affinity, separating it from its solution in much stronger acids, and converting it into an insoluble oxalate. The acid is consequently an excellent test of the presence of lime in solutions.

—Oxalic acid is a corrosive poison, extremely virulent and rapid in its effects when taken into the stomach in large doses; and from the resemblance of its crystals to those of Epsom salts, it has often been sold and administered instead of this purgative with fatal effects. Emetics and the stomach pump may be immediately applied, but the true antidote is copious draughts of water containing pulverized chalk or magnesia. These neutralize the acid, forming with it an insoluble oxalate of lime or magnesia, either of which is harmless. The salts formed by oxalic acid with potassa or ammonia are also poisonous, and consequently these alkalies are not to be used as antidotes. Some of the plants mentioned above, which contain oxalate of potassa, are efficient antiscorbutics, and the acid itself has been used for this purpose.—Oxalic acid is largely employed in calico printing for discharging colors; it is also used for cleaning the straw of bonnet makers and the leather of boot tops, and for removing stains of ink and iron rust from fabrics. Many tons of oxalic acid are now made weekly in England for the calico printers, by heating saw dust with a mixture of hydrate of potash. A concentrated solution of mixed caustic soda and potash, of specific gravity 1.35, is prepared, containing two atoms of hydrate of soda to one of hydrate of potash. Saw dust is introduced in order to form a thick paste, and this is placed in layers on heated iron plates, and stirred constantly while the temperature is gradually raised. The heat is continued for three or four hours, taking care to avoid charring. The mass becomes thoroughly dry, and finally contains 28 to 30 per cent. of oxalic acid in combination with soda. Hydrate of lime converts the oxalate of soda into oxalate of lime, from which oxalic acid is obtained by treatment with sulphuric acid.

OXALIS (Gr. *ὄξις*, sour, the foliage containing an acid, watery juice), a genus of plants of which the common wood sorrel is a familiar representative. This and a few other genera formerly composed the family *oxalidaceæ*, which modern botanists have reduced to a tribe of the geranium family (*geraniaceæ*). The genus contains about 230 species, mostly herbs, or a few having somewhat woody stems; many have bulb-like rootstocks; some have no stem above ground, and all have leaves of three or more leaflets. The flowers are regular, with five sepals and as many petals; stamens ten, often united at the base, with the alternate ones shorter; ovary five-lobed, five-celled, with five distinct styles; the membranaceous, oblong cap-



Common Wood Sorrel (*Oxalis acetosella*).

sule five-celled, each cell opening on the back and liberating two or more seeds; flowers solitary or in many-flowered clusters. Some species produce inconspicuous and particularly fruitful flowers, which are fertilized in the bud. The genus is widely distributed, but the greater number of species are natives of tropical America and southern Africa. Three species are found in the Atlantic states, one of which, the yellow wood sorrel (*O. stricta*), is very abundant, and makes its appearance in cultivated grounds as a weed; it has running subterranean shoots, leafy branching stems, which are at first erect, and then spreading upon the ground, and small yellow flowers in clusters of five or six on axillary peduncles. Our other two species are stemless, their leaves and scapes arising from a rootstock or scaly bulb. The common wood sorrel, *O. acetosella*, also a native of Europe and Asia, is common in woods from Pennsylvania northward to Canada, and it extends to the Pacific. The long petioles bear three obovate, delicate green leaflets, and the flower stalks, 2 to 5 in. high, bear each a solitary flower, with white petals beautifully veined with red. The foliage is pleasantly sour, owing to the presence of binoxalate of potash. Before the discovery of the method

of preparing oxalic acid artificially, it was obtained from this plant, 500 lbs. of the herbage yielding 4 lbs. of the crystals of the binoxalate of potash, known as the salt of sorrel. This oxalis shares with white clover (*trifolium repens*) the credit of being the true shamrock; Bentham regards this as the real shamrock for the reason that it is a native of Ireland, while the clover is of comparatively recent introduction. The violet wood sorrel, *O. violacea*, more abundant southward, has a similar habit to the preceding, but its flower stalks each bear several flowers in an umbel, and they are of a violet color. A large number of the exotic species of *oxalis* are in cultivation, and are favorite plants in greenhouse and window culture, producing an abundance of bright cheerful flowers with the simplest treatment. There are both stemless species and those with long trailing stems among the cultivated ones, and their flowers are white or nearly so, yellow, rose-colored, and crimson, often with two colors in the same flower, as in *O. versicolor*; this is one of the finest, and has its white petals edged on the outside with crimson, so that the flowers when quite closed appear red, when fully open white, and when only partially open white striped with red lines on the under side. *O. Bowiei*, *O. flava*, *O. speciosa*, *O. rosacea*, and others are common in cultivation, and several are treated as border or bedding plants. Nearly all the species are sensitive to the action of light, drooping their leaflets and taking a position of sleep at nightfall, and many of them only open their flowers in the sunshine; one species, *O. sensitiva*, from India, contracts its leaves when touched, and is nearly as irritable as the true sensitive plant. The leaves of several species, especially the common wood sorrel (*O. acetosella*), are mixed with salad to impart a pleasant acidity, and the tubers of others are used as food. The *oca* of the Peruvians consists of the tubers of *O. crenata*, which has spreading stems about 2 ft. high, yellow flowers, and tubers much like a small potato in appearance, tapering at the end toward the plant; there are a white and a red variety, the difference being solely in the color of the tubers. These are cultivated in Peru for their acid leaf stalks, and especially their tubers, which when boiled are farinaceous and nutritious, but have an acid taste that is disliked by most persons; it is said that this may be removed by exposing the tubers to the sun for several days. When the potato disease appeared in Europe this oxalis was one of the various substitutes tested, but on account of the small size of the tubers and the light yield they are not likely to come into general use. The Mexican *O. Deppei* is a stemless species, with four leaflets to the leaves, and flowers which are red and sufficiently showy for it to be cultivated as a garden plant; the roots are parsnip-shaped, about 4 in. long, and have at the top numerous small bulbets by which it can be propagated. The root is boiled and dressed with white

sauce like salsify, and is regarded as very easy of digestion; it is very slow in forming its tubers, and likely to succeed better in southern than in northern gardens.

OXENDEN, *Ashton*, an English bishop, born at Broome Park, near Canterbury, in 1808. He was educated at University college, London, and for many years was rector of Plucklywith-Pevington in Kent. In 1864 he became honorary canon of Canterbury cathedral, and in 1869 was chosen bishop of Montreal, and as such primate and metropolitan of Canada; his jurisdiction covers eight bishoprics, Quebec, Toronto, Ontario, Huron, Nova Scotia, Fredericton, Newfoundland, and Rupert's Land. His publications are very numerous, being mostly of a practical character; among them are: "A Plain History of the Christian Church" (1847); "Barham Tracts" (1859); "The Pastoral Office" (1859); "Baptism and the Lord's Supper simply explained" (1861); "Decision" (1868); and "Lectures on the Gospels" (2 vols., 1869).

OXENFORD, *John*, an English author, born at Camberwell, near London, in 1812, died in February, 1877. He was admitted to the bar in 1833. Among his works for the stage are "My Fellow Clerk" (1835), "Twice Killed" (1835), "A Day Well Spent" (1836), "Porter's Knot" (1869), and "£456 11s. 3d." (1874). He published translations of the "Autobiography of Goethe," the "Conversations of Eckermann with Goethe" (1850), the "Hellas" of Jacobs (1855), a collection of songs from the French entitled "Illustrated Book of French Songs" (1855), and Kuno Fischer's "Essay on Lord Bacon and his Philosophy" (1857). He was long engaged as a theatrical critic for the press, wrote songs for music, and translated various German poems.

OXENSTIERN (Swed. OXENSTJERNA), *Axel*, count, a Swedish statesman, born at Fanö, in Upland, June 16, 1583, died in Stockholm, Aug. 28, 1654. He studied at the universities of Rostock, Wittenberg, and Jena, and visited most of the German courts. In 1606 he was sent on a mission to Mecklenburg; in 1608 he was made a member of the senate; and when Charles IX. became incapacitated, he was chosen president of the council of regency. On the accession of Gustavus Adolphus in 1611 he was appointed chancellor, concluded a peace between Denmark and Sweden in 1613, accompanied the king to Livonia in his campaigns against the Russians, and in 1617 negotiated the treaty of Stolbova, by which Sweden gained a large territory along the Baltic. During the following years he was engaged in warlike operations or negotiations connected with the thirty years' war, and in 1629, through the mediation of France and England, concluded an armistice for six years between Sweden and Poland. He accompanied Gustavus Adolphus in his German campaign, and on the death of the king at Lützen in 1632 assumed the task of continuing the war. He was invested with full powers by the Swedish *Riksb-*

dag, and elected by the German Protestant assembly of Heilbronn chief of the league against Austria. It was not until everything had been placed on a safe footing in Germany that he returned to Sweden, to resume his duties as chancellor, and act as one of the guardians of the young queen Christina, he being the actual ruler of Sweden during her minority. He improved the finances, encouraged trade, and patronized learning; and when the sovereign became of age in 1644 the kingdom was in a most prosperous condition. After that the intrigues of the courtiers gradually undermined his influence. Oxenstiern was an accomplished scholar, and some of his writings, including his correspondence with his son during the negotiation which preceded the peace of Westphalia, have been printed. The second volume of the *Historia Belli Suevo-Germanici*, the first of which is from the pen of Chemnitz, is ascribed to him.

OXYEY, the common name of *heliopsis laevis*, a native plant of the composite family, which resembles the sunflower. It is a perennial, 2 to 4 ft. high, and not rare upon banks and in copses; though called *laevis* (smooth), its leaves are often rough. The sea oxeye (*Borrchia frutescens*) has close botanical relationship with the preceding; it is a somewhat shrubby plant, 6 to 12 ft. high, with yellow flowers, and is found along the coast of Virginia and southward.—Oxeye daisy is *chrysanthemum leucanthemum* (*leucanthemum vulgare* of some authors), a well known weed, which is described and figured under **DAISY**.

OXFORD, a S. W. county of Maine, bordering on New Hampshire, watered by the Androscoggin, Saco, and other rivers; area, about 1,700 sq. m.; pop. in 1870, 33,488. Its surface is in some parts broken and mountainous, but the soil is generally fertile. There are several large lakes, of which Molechunkemunk, Parmachena, and many smaller ones are wholly within the county, and Umbagog and Moose-lucmagantic partly. It is traversed by the Grand Trunk and the Portland and Oxford Central railroads. The chief productions in 1870 were 32,083 bushels of wheat, 181,319 of Indian corn, 201,746 of oats, 15,583 of buckwheat, 701,615 of potatoes, 923,640 lbs. of butter, 207,048 of cheese, 142,444 of wool, 241,032 of hops, 66,134 of maple sugar, and 90,679 tons of hay. There were 6,001 horses, 13,105 milch cows, 7,263 working oxen, 17,531 other cattle, 35,220 sheep, and 3,333 swine; 17 manufactories of carriages and wagons, 1 of emery wheels, 1 of gunpowder, 14 of tanned and 10 of curried leather, 4 of machinery, 6 of starch, 1 of wood pulp, 6 of woollen goods, 6 flour mills, and 23 saw mills. Capital, Paris.

OXFORD, a S. W. county of Ontario, Canada, watered by the Thames and other streams; area, 759 sq. m.; pop. in 1871, 48,237, of whom 18,796 were of English, 12,874 of Scotch, 8,391 of Irish, and 6,182 of German origin or descent. It is traversed by the Great West-

ern and Canada Southern railroads. Capital, Woodstock.

OXFORD (Lat. *Oxonium*), a city of England, capital of Oxfordshire, situated on a gentle hill between the Cherwell and Isis or upper Thames, which here unite, 52 m. W. N. W. of London; pop. in 1871, 31,554. Though irregularly built, with narrow, crooked streets and lanes and few good thoroughfares, its appearance from a distance is picturesque and imposing. The High street is less than two thirds of a mile long and of varying width, nowhere exceeding 85 ft.; but it is interesting for its architectural contrasts, the noble collegiate edifices alternating with quaint old dwelling houses and modern shops. Nearly all the avenues are clean and well paved and lighted, and improvements are constantly going on. The city has an abundant supply of good water. The rivers are crossed by several bridges. The principal churches are the cathedral, which is the chapel of Christ Church college; St. Mary's, which serves as the university church, and has a fine spire; St. Martin's, the "city church," with a clock tower and illuminated dial fronting the High street; St. Peter's in the East, a venerable Norman edifice lately restored; St. Mary Magdalene's, St. Giles's, St. Michael's, St. Aldate's, and All Saints'. In 1872 there were 42 places of worship, of which 22 belonged to the church of England, 5 to the Baptists, 3 to the Wesleyan Methodists, and 2 to the Congregationalists. The city has a free reading room and library, public baths, workhouses, a savings bank, a dispensary, the Radcliffe infirmary, a pauper lunatic asylum, a music hall, a town hall, a council chamber with an interesting collection of portraits, and a county hall and law courts. There are no manufactures, and, with the exception of a trade in the grain produced in the neighborhood, the city depends for support almost entirely upon the university. It has communication with other parts of the kingdom by river, canal, and railway. It is governed by 10 aldermen and 30 councillors, one of whom is mayor; but in certain matters respecting the night police, markets, &c., the university authorities have coördinate jurisdiction. The date of its foundation is unknown. It is mentioned as a seat of learning by Pope Martin II. (about 882). Tradition says it was a favorite residence of Alfred the Great, and in modern history it is noted for the execution of Ridley, Latimer, and Cranmer, and for the severity with which it was treated by the parliamentarians in the civil war, during which it was the headquarters of Charles I., was repeatedly besieged, and finally captured by Fairfax (June, 1646). In 1873 it was selected as a military centre, the government having purchased 20 acres of land at Ballingdon, near Oxford, as the site for a depot.

OXFORD, Earl of. See HARLEY, ROBERT.

OXFORD, University of, one of the two greatest seats of learning in Great Britain. The

city of Oxford, as the scene of important military and political events, is mentioned from the time of Alfred down, but the first indisputable witness to its being a seat of learning is Giraldus Cambrensis, about 1180. It is certain, however, that Vacarius, a Lombard from the university of Bologna, lectured on the civil law at Oxford about 1149, and a foreigner would hardly have selected that city for such a purpose unless it was already frequented by students. The history of the university prior to the time of King John (1199) is almost wholly conjectural; but the following facts have been established. Monasteries and other religious houses existed at Oxford long anterior to any special mention of it as a seat of learning. Attached to many of these were schools which gave gratuitous instruction, and usually support, to those who were preparing for the service of the church; and secular schools sprang up in imitation of the cloistral institutions. Common interests induced the teachers to form a voluntary association for the discussion and decision of questions of general concern. They chose one of their number to preside over them, and as the powers and duties of the association increased, subordinate offices were created. This association, distinct from and of higher authority than any particular school, was the origin of the university of Oxford. The date of its formation and the phases of its development are unknown; it had become a great and flourishing institution long before it was mentioned in any known royal decree or legislative enactment. The first known application to it of the word university (*universitas*) occurs in a statute of the third year of King John (1201); while the earliest known document in which that word is applied to the schools at Paris is an ordinance of Pope Innocent III. dated 1215. At that time, it is said, about 3,000 students were connected with its schools. In 1209 a student accidentally killed a woman belonging to the town, and fearing the consequences fled the place, and three innocent students were seized and hanged. All the scholars of the university quitted Oxford in a body, and they also obtained from the pope an interdict against the town and all persons who should resort to it for the purpose of study. The dispute was finally adjusted, the citizens obtained absolution, and King John conferred upon the university certain privileges, the principal of which was the right to take cognizance of all causes in which a student or the servant of a student was a party. Henry III. favored the university, and the number of students was greater than during any previous or subsequent reign. Anthony à Wood, the principal authority for its history, says that at one time there were in Oxford 30,000 persons claiming to be scholars, though many of these did not really belong to the university; but this is undoubtedly an enormous exaggeration. The first charter recognizing the university as a corporate body, and conferring additional

privileges upon it, was granted by Henry III. in 1244. This was followed by others from him and his successors confirming the old or granting new privileges. Although the prosperity of the town depended almost entirely upon the university, intense hostility existed between the citizens and the scholars. As the latter were all required to wear a gown, the feuds which often broke out in riots between them and the citizens were called quarrels between "town and gown." On St. Scholastica's day, Feb. 10, 1355, a disturbance occurred in which several lives were lost, and the town was laid under an interdict by the bishop of Lincoln, whose diocese then included Oxford. It was released two years afterward on condition that the commonalty should thereafter annually celebrate in St. Mary's church a service for the souls of those killed, and that the mayor, two bailiffs, and 60 of the principal citizens should personally appear in the church at mass and offer a penny each at the great altar; in default of which they bound themselves to pay 100 marks yearly to the university. Subsequently the penance was repeatedly mitigated, but it was not wholly remitted till 1825. The religious troubles of the reign of Henry VIII. diminished the inducements to the study of theology, and from this and other causes the number of students at Oxford greatly declined. In 1546 only 13 degrees were conferred, and in 1552 the number of students on the books was only 1,015, and of these the larger majority had quitted the university. An elaborate act of parliament "concerning the incorporations of the universities of Oxford and Cambridge," sanctioned by Elizabeth in 1570, resumed and defined previous charters; and from that time until the passage of the act of 1854 this was regarded by both universities as the chief source of their powers and privileges. In 1603 James I. granted the privilege, which still continues, of electing two representatives to parliament; they are styled burgesses. By an act of parliament passed in the third year of his reign, Catholics were disabled from "presenting to any ecclesiastical benefice or nominating to any free school, hospital, or donative;" and their rights of presentation and nomination were made over in about equal portions to the two universities. The university of Oxford was distinguished for its loyalty to the Stuarts, and it melted down its plate to assist Charles I. in his struggle with the parliament. This provoked the hostility of the nonconformists, and during their supremacy the university was plundered, and many of its professors and masters were expelled and its scholars forced to leave. The statutes of the university were codified in 1629 by Archbishop Laud, who was elected chancellor in 1630. His code was adopted by the university and ratified by the king in 1635, and was not essentially changed until the act of 1854. By the latter and subsequent acts considerable changes were made in the organization of the

university and the colleges. The greater number of the fellowships and scholarships had been subjected by their founders to conditions which in time had become impracticable or absurd, and they were altered or abolished by the act of 1854. One of the most important of these changes was the throwing open to general competition of a large number of fellowships and scholarships which had before been restricted to particular classes of persons; and in many cases, where the original restrictions were retained, it was provided that they should be open to general competition in case no duly qualified candidates presented themselves.—The following account of the constitution of the university, the colleges, and other institutions connected with it, represents it as it exists at the present time. The official title of the university as a corporate body, “The Chancellor, Masters, and Scholars of the University of Oxford,” has existed for centuries, and was confirmed by act of parliament in the reign of Elizabeth. The powers of the university are vested in four bodies. The “House of Congregation” consists of regents. Formerly every graduate acquired the right to teach, and incurred the obligation of doing so, if necessary, for a certain limited time. Those who voluntarily entered upon the office of teacher were called *regentes ad placitum* or voluntary regents; those who were under obligation to teach, if the number of voluntary regents was not sufficient, were said to be *necessario regentes*. The original meaning of these terms has become obsolete, but they are now used as follows: all doctors and masters of arts for two years from the end of the term in which they were admitted to their degrees are *necessario regentes*; all professors, doctors resident in the university, heads of colleges and halls, masters of the schools, censors and deans of colleges, are *regentes ad placitum*. The business of the house of congregation is confined to the ratification of the nomination of examiners and to the granting of ordinary degrees. The “House of Convocation” consists of all who are or have been regents, provided their names have constantly been kept on the books of some college or hall or of the delegates of unattached students, and they have paid all statutable fees. All the formal business of the university as a corporate body, except what belongs to the house of congregation, is transacted in the house of convocation. It confers honorary degrees and others granted out of the usual course; and nearly all offices in the gift of the university are filled by it. All questions are decided by the majority of votes, except that the chancellor or vice chancellor or his deputy singly, and the two proctors jointly, have a right of veto in all matters except elections; but practically the right is never exercised. No statute is binding until it has received the assent of convocation. The “Congregation of the University of Oxford” consists of the chancellor,

the heads of colleges and halls, the canons of Christ Church college, the proctors, members of the hebdomadal council, professors, examiners, and several other officials, and of all those members of convocation who resided within one mile and a half of Carfax during the year which ended on the first day of the preceding September. Carfax is the name given to a place where four streets meet, about the centre of the town. The passing of 140 nights within the prescribed limits is considered a sufficient compliance with the requirement. The chief business of the congregation is legislative. In its new statutes proposed by the hebdomadal council are promulgated, discussed, and amended. Every question is decided by a majority, and no right of veto exists. A statute approved by congregation goes, after an interval of seven days, to convocation for final adoption or rejection. The “Hebdomadal Council” consists of official and elected members. The official members are the chancellor, vice chancellor, late vice chancellor (for one year after he has ceased to hold office, or until the next triennial election), and the two proctors. The elected members are six heads of colleges or halls, six professors (who may also be heads of houses), and six members of convocation of not less than five years’ standing (who may be heads of houses or professors). They are elected by the congregation of the university in such a way that one half of each of the three classes vacate their seats every three years, being however reëligible. This council has the initiative of all the legislation of the university. The highest officer of the university is the chancellor, who is elected for life by the house of convocation, and receives no pay. Formerly a resident ecclesiastic was always chosen, but for more than 200 years the office has been conferred upon noblemen who have been members of the university. The present chancellor (1875) is the marquis of Salisbury, formerly fellow of All Souls college. Except on rare occasions the duties of the office are discharged by the vice chancellor, who is annually nominated by the chancellor from the heads of colleges, and must be approved by convocation. The office is generally held by nomination for four years. The vice chancellor appoints from the heads of colleges four pro-vice-chancellors to serve in case of his absence. The office of *seneschallus*, or high steward, is now merely honorary, and the pay nominal. It is at present held by the earl of Carnarvon. There are two proctors, elected annually from the colleges and halls, and they each appoint two deputies. They are the chief police officers of the university, and have a large police jurisdiction in the town. There are numerous other officers. There are eight regius professorships (so called because founded by sovereigns of England), as follows: of divinity, civil law, medicine, Hebrew, and Greek, founded by Henry VIII.; of modern history, by George I.; and of pastoral theol-

ogy and of ecclesiastical history, by Victoria. Those founded by individuals after whom they are named, and otherwise, with their dates, are as follows: Margaret professorship of divinity, 1502; Savilian of geometry and of astronomy, 1619; Sedleian of natural philosophy, and Whyte's of moral philosophy, 1621; Camden of ancient history, 1622; Tomlins of anatomy, 1624, annexed in 1858 to the Linacre of physiology; of music, 1626; of botany, 1633; Laudian of Arabic, 1636; of poetry, 1708; the lord almoner's of Arabic, date unknown; of experimental philosophy, 1749; Vinerian of English law, 1758; clinical, 1780; Rawlinsonian of Anglo-Saxon, 1795; Aldrichian of anatomy, of the practice of medicine, and of chemistry, 1803, of which the first was annexed in 1858 to the Linacre of physiology, the second to the regius of medicine, and the third was suppressed in 1866, when the Waynflete of chemistry was established at Magdalen college; of mineralogy, 1813; of geology, 1818; of political economy, 1825; Boden of Sanskrit, 1830; of logic; of the exegesis of Holy Scripture, 1847; Corpus of Latin literature, Chichele's of international law and diplomacy and of modern history, Waynflete of moral and metaphysical philosophy and of chemistry, and Linacre of physiology, all in 1854; Hope of zoology, 1861; of comparative philology, 1868; Corpus of jurisprudence, and Slade of fine art, 1869; and Ford of English history, 1870. The pay of the professors is from £50 to £900 a year, averaging about £380. The majority of the professors have heretofore taken little part in practical teaching. Except in a few merely formal cases, attendance upon their lectures is not compulsory; and they have employed their time in such literary or artistic pursuits as their tastes dictated. Besides these professors, there are a *choragus*, or master of musical praxis; demonstrators of experimental philosophy, chemistry, and anatomy; readers of English law and ancient history; lecturers on the Septuagint; teacherships of modern languages; and teachers of Hindostani and of Indian law and history. There are 37 scholarships, most of which are bestowed for proficiency in some particular branch of study; some are only open to those who have passed all examinations for the degree of B. A., and other conditions differ in each case. Most of them are tenable for three years, have an average annual income of about £60, and are open to general competition. There is one exhibition tenable for one year, with an income of £25. There are 18 prizes, but not all of them offered for competition every year. Many of them can be competed for only by those who have received the degree of B. A. Their average value is about £30.—The following named buildings and institutions belong to the university. The Bodleian library, founded by Sir Thomas Bodley, opened in 1602, is one of the great libraries of the world. (See **BODLEIAN LIBRARY**.) Connected with it is a reading room

called the *Camera Bodleiana*, which contains all the newest works and the great Hope collection of engraved portraits. The Clarendon press building was completed in 1830. All the printing of the university, and of the works of private authors the publication of which the university sees fit to undertake, is done here. Books printed for the university have the words *E Typographeo Clarendoniano*, or "At the Clarendon Press," in the imprint. The theatre, founded by Gilbert Sheldon, archbishop of Canterbury and chancellor of the university, was opened in 1669. The Ashmolean museum was erected by the university (1679-'83) for the reception of the collection of natural and artificial curiosities presented by Elias Ashmole; it also contains a museum of antiquities and the Arundel marbles. The Clarendon building (formerly the Clarendon press building), so called because its cost was partly defrayed from the copyright on Lord Clarendon's "History of the Rebellion," which was presented to the university, is the seat of its general business. It contains the delegates' room, police room, and various other offices. The Radcliffe observatory, erected with funds bequeathed by Dr. Radcliffe, is well furnished, and observations are regularly made. The Taylor institution, for the encouragement of the study of modern European languages, was erected in 1848 from a bequest of Sir Robert Taylor, and forms one building with that next mentioned. It contains a library and a reading room, in which may be found most of the leading periodicals of the continent. Its curators also have charge of a bequest of W. T. Horner, earl of Ilchester, for the encouragement of the study of the languages, literature, and history of the Slavic nations. The university galleries, containing works of art, were opened in 1845. The university museum, begun in 1855, is intended to promote the study of natural science. It contains lecture rooms, a spacious library and reading room, work rooms, laboratories, experimental apparatus, and all other facilities for investigating the phenomena of nature. This building also now contains the Radcliffe library. The botanic garden of about five acres was founded in 1632. The convocation house is used for the general business of convocation and for conferring degrees. The "divinity school" and "the schools" are no longer used for the purposes of instruction, but for conferring degrees in divinity, for public examinations, and other purposes.—Besides these institutions directly under the control of the university as a corporate body, there is a much larger number called colleges and halls, each with a separate government, but organically connected with the university. Previous to the middle of the 13th century the students at Oxford resided in the town in such places as their circumstances dictated. Sometimes several students would associate themselves, hire a building, choose some graduate of the higher degrees as their principal or guardian,

and live in common. Their houses were variously called inns, hostels, or halls. The number of these halls is said to have at one time exceeded 300. Individuals at different times purchased or constructed buildings for the exclusive use of students, and appropriated funds for the maintenance of a limited number, who were called *socii* or fellows. They were students who had already received a degree from the university, and had a head, variously called warden, master, rector, &c., usually elected by themselves. To them were attached in most cases a limited number of students, generally those who had not yet taken a degree, called scholars, for whose maintenance funds were also appropriated. These bodies, consisting of a head, fellows, and scholars, were called colleges. They were legally incorporated, their powers being vested in the head and fellows. At first the privileges of the college were restricted to the persons constituting the corporation and maintained by its funds. Gradually other students were admitted, who paid for board and lodgings in the college building. These paying students were called "commoners," because they took their "commons" or meals in the college; and two classes were recognized, called "gentleman commoners" and "commoners" simply, the former dining at a separate table and enjoying some special privileges in consideration of higher pay. The distinction has now become nearly obsolete. In discipline and instruction there is no distinction between scholars and commoners. Thus the colleges became endowed institutions for the academical instruction of all persons able to pay for it. As their number increased that of the halls, which were mostly dependent on the students for support, declined. About 1570 the earl of Leicester, then chancellor of the university, obtained for himself and successors in office the right of appointing the heads of all halls which should thereafter be established; and by refusing to appoint a head, the chancellors prevented the opening of any new hall from that time till 1855. Gradually the whole business of instruction fell into the hands of the colleges and remaining halls. The only way of entering the university was to be admitted to one of these, and such admission and the payment of the required fees constituted a person a member of the university. But the university only, in its independent corporate capacity, could confer degrees. All members of colleges who re-

ceive stipends from the corporate revenues are said to be "on the foundation." At All Souls there are no scholars; at Keble there are no fellows or scholars; at Merton the scholars are called post masters; at Magdalen, demies (in Latin *semi-socii*); at Christ Church the fellows



Christ Church College, West Front.

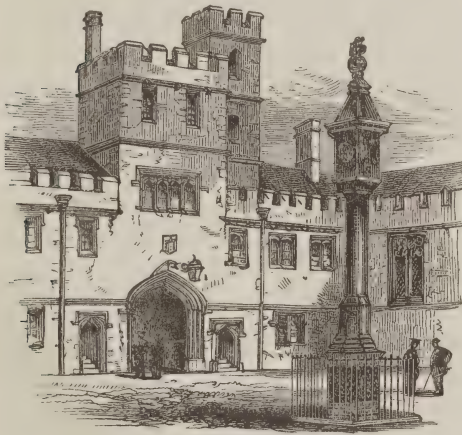
are called senior students, the scholars junior students. The head and fellows are in most cases the governing body. Discipline is exercised by the head and certain officers appointed by the fellows. The dean of Christ Church is appointed by the crown, the provost of Worcester by the chancellor of the university, the warden of Keble by the council of that college, and all other heads by the fellows. The head generally holds his office for life. Fellows and scholars are mostly elected by heads, and fellows after a competitive examination. Fellowships are tenable for life, but are vacated by marriage, ecclesiastical preferment, or accession to a certain amount of property. Scholarships are generally tenable for five years, and the stipends average about £80. There is also a large class of beneficiary students who are called exhibitioners, and the places they hold exhibitions, the right of nomination to which is vested in some institution of learning. The difference between them and scholarships is merely technical. The exhibitioners all receive stipends varying in amount from £25 to over £100. The university comprises 20 colleges, as follows: University college, founded by William of Durham in 1249; Balliol, by John Balliol and Devorgilla his wife, between 1263 and 1268; Merton, by Walter de Merton, bishop of Rochester, at Malden in 1264, removed to Oxford before 1274; Exeter, by Walter de Stapleton, bishop of Exeter, in 1314; Oriel, by Edward II. in 1326; Queen's, by Robert Eglesfield, chaplain to Philippa, queen of Edward III., in 1340; New, by William of Wykeham, bishop of Winchester, in 1386;

Lincoln, by Richard Fleming, bishop of Lincoln, in 1427; All Souls, by Henry Chichele, archbishop of Canterbury, in 1437; Magdalen,



Oriol College.

by William of Waynflete, lord chancellor, in 1456; Brasenose, by William Smith, bishop of Lincoln, in 1509; Corpus Christi, by Richard



Corpus Christi College.

Fox, bishop of Winchester, in 1516; Christ Church, by Henry VIII., in 1546-'7; Trinity, by Sir Thomas Pope, in 1554; St. John's, by Sir Thomas White, in 1555; Jesus, by Queen Elizabeth, in 1571; Wadham, by Nicholas Wadham, in 1613; Pembroke, by James I., at the expense of Thomas Tesdale and Richard Wightwick, in 1620; Worcester, by Sir Thomas Cookes, in 1714; Keble, by subscription as a memorial to the Rev. John Keble, in 1870. According to tradition, University college represents a school founded by King Alfred in 872, and in 1872 it celebrated its millennial anniversary. Balliol admits no one who claims any privilege on account of rank or wealth; its standard of scholarship is perhaps the high-

est at Oxford. New is intimately connected with the preparatory school and college at Winchester. Lincoln has no undergraduates, admitting only those who have received the degree of B. A. Christ Church is a cathedral establishment as well as a college. In the extent and magnificence of its buildings, the munificence of its endowments, and the number of its members, it surpasses all others at Oxford. In the tower over its principal gateway is the famous bell called Great Tom of Oxford, weighing 17,000 lbs. There are five academical halls remaining, the heads of which are called principals. They are unincorporated, and consequently property designed for their benefit must be held in trust by the university or some other trustee. In this way a few scholarships and exhibitions have been founded, and provision made for the principals in some of them. With these exceptions they have no endowments. In discipline, instruction, attainment of degrees, and university privileges, there is no distinction between students in halls and colleges. The halls are as follows: 1. St. Mary, given to Oriol college by Edward II., and made a separate school by that society in 1333; it subsequently became independent. 2. Magdalen, which became independent in 1602. In 1816 parliament authorized Magdalen college to prepare Hertford college, which had lapsed to the crown, for the reception of the principal and members of Magdalen hall, and to resume possession of the old hall and site; this was accomplished in 1822. A bill is now (1875) before parliament to make it a college under the name of Hertford. 3. New Inn, conveyed to New college in 1392, rebuilt in 1460. 4. St. Alban, founded as an ecclesiastical establishment in 1230; it came into the possession of Merton college in the 16th century, and was subsequently made independent. 5. St. Edmund, which came into the possession of Queen's college in 1557, with which it still has some connection, its students being admitted to the lectures of Queen's. A statute passed in 1855 enacts that any member of convocation above the age of 28 may on certain conditions obtain from the vice chancellor a license, with the title of "licensed master," to open a suitable building as a private hall for university students. There is no distinction between them and other students as to discipline and privileges. Only one such, called Charsley's hall, exists. In 1868 persons were first permitted under certain conditions to become students and members of the university without being attached to any college or hall. Such students (called *non ascripti*) reside in the town and have all the rights and privileges of other students. They are under the general superintendence of a board styled "delegates of students not attached to any college or hall," consisting of the vice chancellor and four members of convocation nominated by him and the proctors. Two of these, styled censors, have the immediate charge of the conduct

and studies of the unattached students. The colleges and halls examine applicants for admission previous to matriculation, but the examination is generally not at all difficult. A student whose name has been inscribed on the books of a college or hall, or of the delegates of the unattached students, and has paid the necessary fees, is a member of the university. No university examination is required. The academic year is divided into four terms. Michaelmas term extends from Oct. 10 to Dec. 17; Hilary or Lent term, from Jan. 14 to the day before Palm Sunday; Easter term, from the Wednesday after Easter day to the Friday before Whitsunday; Trinity or Act term, from the day before Whitsunday to the Saturday after the first Tuesday in July, but may be continued by congregation. There is no vacation between the last two terms.—To obtain the degree of B. A. it is necessary to pass three distinct examinations. The examiners are appointed by the university. The examinations are partly in writing and partly *viva voce*. The first examination, called responsions, or in the language of the students the little go, is conducted by the “masters of the schools,” six in number, who are nominated yearly in convocation. Responsions are held three times a year. Every candidate is examined in Latin and Greek grammar, Latin prose composition, one Latin and one Greek author, arithmetic, and either Euclid or algebra. A considerable range of choice is allowed to the candidate in regard to the authors in which he wishes to be examined. Every candidate who passes responsions satisfactorily receives a certificate called a *testamur*. A candidate who fails to pass the examination is said to be “plucked.” Having passed responsions, the student chooses whether he will try for a “pass” or a “class;” that is, whether he will simply try to get his degree of B. A., or will also try for honors. If he “reads for honors,” he will find it necessary to employ a private tutor. The second examination, called the first public examination, is held twice a year. It is conducted by ten moderators, and is called moderations. Candidates for a pass must offer portions of at least three Greek and Latin authors of the best age (two Greek and one Latin or two Latin and one Greek), one at least being a portion of a historical or philosophical work, and either logic or the elements of geometry and algebra. Candidates for honors in mathematics are examined in every branch from algebra up to the integration of differential expressions and the elements of the calculus of finite differences. Conic sections and geometry of three dimensions must be treated both geometrically and analytically. The second public examination, if passed successfully, entitles the candidate to his degree. It is held twice a year, and is conducted by 22 public examiners, divided into six schools. No student can offer himself for examination in classics before his 12th term, unless his 11th happens to be Easter, in which

case he may offer himself in that term. Except in certain cases, he cannot be a candidate for honors after his 16th term. For candidates for a pass merely, this examination is comparatively easy, but for honors it takes a very wide range. Candidates for honors are examined in chronology, geography, and antiquities, and they may be called upon to compose in Latin, Greek, and English. Logic is indispensable with candidates for the highest honors. In mathematics it may be said that it is as severe as the examiners know how to make it. It embraces every branch of pure mathematics from algebra to the calculus of variations, and in mixed mathematics mechanics, optics, and astronomy. After the examinations for honors the successful candidates in each school are arranged in four classes, and the names in each class are arranged alphabetically and published. To be named in the first class is the highest honor. Peers, sons of peers, and certain others of the nobility, are by statute entitled to certain advantages over other students; but these are always waived, and in some colleges a refusal to waive them would be considered sufficient ground for denying admission. To obtain the degree of B. A. at Oxford is perhaps quite as easy as at most of our American colleges; to obtain the honor of a “first class” is extremely difficult.—The total amount of college and university fees payable by each student from matriculation to graduation is about £65. The expense of living for an economical student is about £250 a year, or £300 if he employs a private tutor. The number of “members on the books” in 1873–4 was 8,532, and of undergraduates 2,392. The number of the latter in actual attendance cannot be exactly ascertained, but was probably about 2,000. The number of matriculations in 1872, the last year reported, was 632, and of degrees of B. A. conferred, 396. Previous to the year 1874 no authentic information in regard to the aggregate revenue and expenditure of the university colleges and halls was accessible to the public. In 1872 a royal commission was appointed “to inquire into the property and income of the universities of Oxford and Cambridge, and of the colleges and halls therein,” &c. The report of the commission, published in 1874, exhibits the condition of affairs as it existed in 1871, and it has not since been essentially changed. Besides its copyholds of inheritance, the university of Oxford owns 7,683 acres of land, and the colleges and halls 184,764 acres, situated in different parts of England and Wales. The total income of the university proper in 1871 was £47,589, and of the colleges and halls £366,254; total, £413,843. The sources of this income were as follows: from lands, £183,074; from houses, £29,996; from tithe and other rent charges, £39,609; from stocks, shares, &c., £37,201; from other property, £15,070; and from members of the university, £110,893. This income was expended as follows: payments to heads of colleges,

£30,544; to professors, £13,500; to fellows, £101,171; to scholars and exhibitors, £26,226; all other expenditures, £242,402. Besides the revenues above mentioned, the university, colleges, and halls have in their gift 444 benefices, with an income of £188,695.

OXFORDSHIRE, a S. county of England, bordered S. and S. W. for 70 m. by the river Thames or Isis, and enclosed by the counties of Warwick, Northampton, Buckingham, Berks, and Gloucester; area, 735 sq. m.; pop. in 1871, 177,956. It is very irregular in outline, and the surface is greatly varied. In the southeast are the Chiltern hills, abounding in forests and tracts of fertile land; the central and northern portions, with the exception of a not very elevated ridge, are mostly flat, but well cultivated. The principal rivers are the Thames, or Isis (by which latter name it is known until it is joined by the Thame), the Evenlode, Windrush, and Cherwell. The soil is generally very fertile, and the population is principally engaged in agriculture, especially in dairy husbandry. The county has long enjoyed a reputation for its beautiful woods, and the abundance of its meadows and pastures. There are many interesting antiquities. The principal towns are Oxford, the capital, Woodstock, and Banbury.

OX GALL, the bile of the ox, a viscid green or greenish yellow fluid, of bitter and slightly sweetish taste, found chiefly in a membranous bag in the ox. It varies in consistency, sometimes being very limpid, and at others like a sirup. (See **BILE**.) It possesses properties which render it of value in the arts. It dissolves greasy matters, and for cleansing woollen stuffs upon a large scale it is sometimes preferred to soap. To preserve it from putrefying it need only be evaporated at a gentle heat to the consistency of an extract; and when wanted for use it may be dissolved in water slightly alkaline. The purified ox gall is much used by artists on account of its property of combining with colors, giving them more tenacity and fixing them strongly, while it also makes them flow more freely and often increases their lustre. It may either be mixed with the colors or applied to the paper after the colors. It is advantageously applied combined with gum Arabic as a light varnish, which however admits of other shades being added without mixing with the first. With lampblack and gum water it makes a beautiful black paint or ink that may be used instead of India ink. The lampblack is first mixed with the gum water, and the purified ox gall is then added. It fixes sketches in lead pencil, and does not prevent them from being afterward tinted with colors in which a small proportion of ox gall is mixed. It is highly recommended for use in painting on ivory, as it removes from this all greasy matter, and causes the colors to spread freely, and penetrate into the ivory. It is equally useful in the application of paints to transparent paper. For these effects it is essential

that the purified article should be prepared from very fresh ox gall. The method of purifying in best repute is as follows: To a pint of the gall boiled and skimmed add an ounce of pulverized alum, and leave the liquor on the fire till the combination is complete. Another pint is treated in the same way with an ounce of common salt instead of alum. When cold the liquids are separately bottled and loosely corked. They should then be kept for three months, when a sediment subsides, and the liquor becomes clearer. There is still present a yellow coloring matter which would affect green and some other colors, and which is separated as a coagulum by turning off and mixing the clear portions of the two mixtures in equal quantities. The liquid is then obtained by filtering perfectly purified and colorless. It improves by age, and never disengages a bad odor, nor loses its useful properties.

OXIDES, a general term applied to the compounds of oxygen with other bodies, particularly the binary compounds with the other elements. Their number and variety are very great, for oxygen is the most widely diffused and abundant of all the elementary substances. Water is an oxide of hydrogen, and the geological formations are principally composed of various oxides of the metallic and non-metallic elements, as oxide of silicon or silica in quartz rock, oxide of iron in various iron ores, and oxides of aluminum and silicon in clay and feldspathic rocks. The oxides exist in all three of the physical forms of matter, the solid, liquid, and gaseous. The metallic oxides are solid at ordinary temperatures, and most of them retain this state at high temperatures. Oxide of hydrogen, water, is a liquid at the common pressure of the atmosphere between 212° and 32° F.; above 212° it has a gaseous, and below 32° a solid form. The oxides of carbon, carbon monoxide and carbon dioxide, commonly called carbonic oxide and carbonic acid, are gases, the former never having been liquefied. Carbonic acid has, however, been liquefied and frozen. (See **CARBONIC ACID**, and **HEAT**.) According to the proportion of the number of equivalents with which oxygen enters into union with other bodies, the oxides receive the names of monoxide or protoxide, dioxide (deutoxide or binoxide), teroxide or tritoxide, tetroxide, pentoxide, and also suboxide and peroxide, for lowest and highest oxides. The series of oxides of some of the elements are remarkable for regularity of composition, as the oxides of nitrogen and manganese. (See **NITROGEN**, and **MANGANESE**.) The oxides are conveniently divided into three principal groups, the first containing all those which resemble the oxides of potassium, sodium, silver, and the lower oxides of lead, and which are called basic oxides or bases. In the second group the oxides of sulphur and phosphorus may be taken as types. They are called acid oxides, and are capable of uniting with the basic oxides and forming compounds called

salts. Thus when sulphuric oxide (anhydrous sulphuric acid, SO_3) is passed in a state of vapor over oxide of barium, BaO , combination takes place with evolution of heat and light, and sulphate of barium is formed containing all the elements of the original bodies ($\text{BaO} + \text{SO}_3 = \text{BaSO}_4$ or BaO, SO_3). There is an intermediate group of oxides, called neutral oxides, because of their indifference to entering into combinations. The black oxide, binoxide or dioxide of manganese, MnO_2 , is an example of this group, the monoxide of the same metal being basic and the higher oxides acid. The dioxide of lead (peroxide) may also be classed with these; for although it possesses feeble acid properties, and plumbates of the alkalis may be formed, they are decomposed by solution in water. Moreover, the dioxide of lead in the presence of acids is generally decomposed, with the formation of a salt of the monoxide. The three groups are not separated by very decided lines, although the well marked types are characteristic. They blend together upon their borders by imperceptible degrees, so that the same oxide will exhibit basic reactions toward one body, while it behaves like an acid toward another. In general it may be said that when oxygen combines in several proportions with a metallic element, the lower oxides are basic, while the higher ones have an acid character.

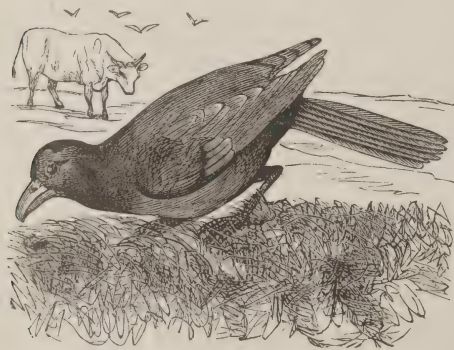
OXLEE, John, an English clergyman, born Sept. 25, 1779, died Jan. 30, 1854. He was rector of Scawton, Yorkshire, from 1816 to 1826, and of Molesworth, Hants, from 1836. He devoted much time to the study of oriental languages, and published several theological works, the most important of which are: "Christian Doctrine of the Trinity and Incarnation" (3 vols. 8vo, 1815-'50); "Sermons on the Christian Hierarchy;" and "Letters on the Conversion of the Jews" (1843).

OXLIP. See PRIMROSE.

OXPECKER, a bird of the starling family, and the genus *buphaga* (Linn.), inhabiting the

tip; the wings long and pointed, the first quill very short and the third the longest; the tail long, broad, and wedge-shaped, with the end of each feather pointed; tarsi and toes robust, and the claws compressed, curved, and sharp. The best known species, *B. Africana* (Linn.), is between 8 and 9 in. long, reddish brown above and yellowish white below; the bill is yellowish, with a red tip. It is shy, generally seen in flocks of seven or eight, about herds of cattle, alighting on their backs and extracting the larvæ of the bot flies (*estrîdæ*) which infest them; the bulging of the bill at the end is admirably adapted for gently squeezing out these and other parasites from under the skin, which form their chief food. Another species, *B. erythrorhyncha* (Stanl.), has a red bill.

OXUS, the classical and still common name of the Amoo Darya or Jihoon, an important river of western Asia. It has its source about 15,600 ft. above the sea, in the Sir-i-Kol (Lake Sir), or Lake Victoria, in the district of Pamir, and on the recently defined boundary between Afghanistan and eastern Turkistan; flows in a generally W. direction, forming the northern Afghan boundary, as far as the post of Khodja Salah; then takes a N. W. course through Bokhara and Khiva, and falls through several mouths into the sea of Aral. Its length is between 1,200 and 1,300 m. For about 300 m. of the first part of its course it is called the Panja; and in this distance it receives five important and a great number of smaller affluents, draining E. Bokhara and N. E. Afghanistan. Below the most westerly of these five affluents, the Koksha river, the main stream receives the name of Amoo Darya; and from this point to its mouth it is navigable, but flows through the almost completely desert waste of Khiva. Its delta is low and marshy, and several of its mouths are so shallow as to be impassable even for small craft. The greatest breadth of the main channel of the stream is about 3,200 ft.; its greatest depth a little more than 5 fathoms. The valley of the river, and especially that of the upper Oxus, has long been one of the most interesting regions for geographers and ethnologists; for the latter, because of the common hypothesis which regards the region about its source as the cradle of the human race; and for the former, on account of the interesting explorations made during recent years, and the theories and discoveries with regard to the ancient and modern beds of the river. It seems conclusively established that the Oxus at one time, through a course still clearly traceable, flowed into the Caspian sea. The peculiar features of the whole Khivan region, supposed to have once formed the bed of an inland sea, add to the interest of the Oxus valley.—The Oxus has been important in political history. Alexander's eastern campaigns brought him several times to its banks; and its valley was the scene of important events in later times. Recently it has been brought prominently into discussion



Oxpecker (*Buphaga Africana*).

warm parts of Africa; it is also called "beef-eater." The bill is pincer-like, stout and broad at the base, with depressed culmen and curved

in connection with questions of Russian possessions in central Asia. (See *AFGHANISTAN*, *BOKHARA*, and *KHIVA*.) Of the numerous books and papers written upon the Oxus, see especially Sir H. C. Rawlinson's "Monograph on the Oxus" ("Journal of the Royal Geographical Society," 1872), and for description MacGahan's "Campaigning on the Oxus, and the Fall of Khiva" (London and New York, 1874).

OXYDENDRUM. See *TREE SORREL*.

OXYGEN (Gr. *ὀξύς*, acid, and *γεννάειν*, to generate), the most abundant of all elementary substances, having when free a gaseous form, which has lately been reduced to a liquid. Its symbol is O, its atomic weight 16. It composes eight ninths of the water on the globe, nearly one fourth of the atmosphere, and a large part of the earth's crust, principally in the form of oxides of the various metallic elements. It was discovered by Priestley in England in 1774, and almost simultaneously by Scheele in Sweden. It was called by Priestley dephlogisticated air, and by Scheele empyreal air. Condorcet proposed the name vital air, in reference to its agency in supporting life. Lavoisier, whose claim to its subsequent discovery is disputed, made a series of careful experiments in which he proved that the combustion of bodies in the air consisted in their union with this gas, to which he gave the name of oxygen, because he thought it essential to the constitution of an acid; it has since been shown that this view was erroneous.—

Preparation. Oxygen may be obtained by several different methods, which depend upon different physical as well as chemical principles. It may be mechanically separated from the nitrogen of the atmosphere by employing the principle of osmose in dialysis (see *DIALYSIS*), a process due to Graham. It may be obtained from water by electrolysis (see *GALVANISM*, vol. vii., p. 596); from several of its compounds by the dissociating action of heat, as from peroxide of mercury in the original experiment of Priestley; from other higher oxides of metals by heat alone, or by the joint action of heat and some substance which will unite with a lower oxide, thus leaving a part of the oxygen free. Until recently, the usual mode of preparing it in large quantities was to subject binoxide of manganese to a red heat in a furnace, as shown in fig. 1. The cylindrical cast-iron retort *a* contains the binoxide, which is placed in the furnace *b*. One pound of good oxide will yield six or seven gallons of oxygen, with some carbonic acid, which may be removed by means of the Woulfe's wash bottle *c*, containing a solution of potash or soda; MnO_2 becomes by the action of heat $\text{MnO} + \text{O}$. It may be obtained from binoxide of manganese by employing strong sulphuric acid and a moderate degree of heat, a glass flask or retort being used in place of iron. The reaction in this case may be represented by the following equation: $\text{H}_2\text{SO}_4 + \text{MnO}_2 = \text{MnSO}_4 + \text{H}_2\text{O} + \text{O}$. It may be procured by the dissociating action

of heat on sulphate of zinc, which at a red heat gives off a mixture of sulphurous acid and oxygen, from which the sulphurous acid may

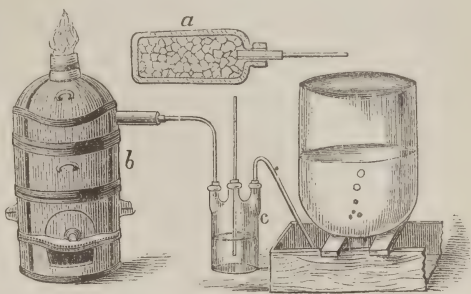


FIG. 1.

be removed by washing, either with an alkaline solution or with water. Oxygen may also be obtained in decomposing sulphuric acid by passing its vapor over red-hot platinum foil or sponge, the products being, as in the last case, sulphurous acid and oxygen, $\text{H}_2\text{SO}_4 = \text{H}_2\text{O} + \text{SO}_2 + \text{O}$. This process is recommended by Deville and Debray as the cheapest method for procuring it in large quantities. For class-room experiments and lectures oxygen is usually obtained by decomposing with heat chlorate of potash, KClO_3 , which becomes $\text{KCl} + 3\text{O}$. This may be effected with the salt alone, but the high temperature required to produce perfect decomposition, and the violence with which it takes place, make it preferable to mix the salt with about its own bulk of some oxide, as binoxide of manganese. The operation may be conducted in apparatus shown in fig. 2. Boussingault proposed a method of obtaining oxygen by alternately oxidizing and deoxidizing a metal or metallic base. The substance used by him was the oxide of barium or barytes, and it is raised to the peroxide by passing a current of slightly moistened air, deprived of carbonic acid, over the protoxide heated to redness in a porcelain tube. When peroxidation has taken place, the current of air is cut off, and the tube is heated to full redness, which drives off the surplus oxygen,

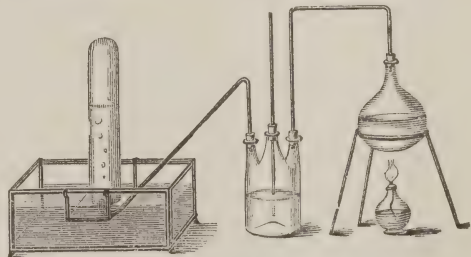


FIG. 2.

and reduces the barytes again to a protoxide. Maréchal and Tessié du Motay prepare oxygen in large quantities by heating manganates,

permanganates, or chromates of the alkalis or alkaline earths, in a current of superheated steam. The operation is conducted as follows: Bin oxide of manganese is stirred to a paste with a solution of caustic soda. This paste, subjected to the action of hot air deprived of carbonic acid, is converted into manganate of soda. If now the manganate is subjected to the action of a stream of superheated steam, the salt is decomposed, the soda becoming a hydrate, and the manganic acid being reduced to a lower degree of oxidation, while a portion of its oxygen is liberated. Cylindrical iron retorts are used, through which hot air and superheated steam are alternately passed, each operation producing alternate oxidation and deoxidation of the mass, so that it may be continuous. It is said that a charge of 10 lbs. of the mass will yield 80 gallons of oxygen gas, even after it has undergone 80 operations. Apparatus of the kind is used in New York for street illumination.—*Properties.* Oxygen is colorless, tasteless, and inodorous, and the least refractive of all the gases. Compared with atmospheric air, it is as 0.83 to 1. No degree of cold or pressure yet applied has resulted in its liquefaction. Its specific gravity is 1.1056, 16 times heavier than hydrogen. Its specific heat compared with that of an equal volume of air, according to De la Roche and Bérard, is 0.9765. According to Tyndall, it has less power to absorb and to radiate heat than other gases. Faraday showed that it is the most magnetic of all gases; compared with air its magnetic power is as 5 to 1; with nitrogen, about 40 to 1. In this respect its position among gases is like that of iron among metals, and like this metal its magnetism is destroyed by heat, but on account of its gaseous condition returns on cooling, while iron remains demagnetized from its molecules having received a set. Faraday suggested that the diurnal variation of the magnetic needle may be caused by the increase and decrease of the magnetic force in the atmospheric oxygen from the variation of solar heat. Water dissolves oxygen sparingly, 100 volumes of water at 60° F. dissolving 3 volumes of the gas, and at 32° about 4 volumes. The air which is held in solution by terrestrial waters contains a much larger proportion of oxygen than atmospheric air, and this condition adapts it to the respiration of aquatic animals.—Oxygen is what is usually termed an active supporter of combustion; most bodies which are called combustibles, as hydrogen and carbohydrogen gases, coal, wood, and the various oils, burn with vividness in it when raised to a red heat. But it is strictly more correct to say that all the elements which unite in combustion are supporters of combustion. A jet of oxygen may be burned in an atmosphere of hydrogen, as well as a jet of hydrogen in an atmosphere of oxygen. Charcoal bark, heated to redness and introduced into a vessel of oxygen, is consumed with brilliant scintillations, unaccompanied with flame,

in consequence of the instantaneous conversion of the carbon into carbonic acid, without the intermediate production of carbonic oxide, which in ordinary charcoal combustion is produced and causes a faint blue flame. (See FLAME, and COMBUSTION.) Phosphorus, when ignited in a small cup attached to a bent wire, and lowered into a vessel of oxygen (cautiously, to avoid burning the hand), burns with exceeding brilliancy. If the piece is large enough not to be consumed before it boils, the vapor, becoming somewhat diffused, will give the bell glass the appearance of an incandescent body. The product of the combustion is phosphoric acid (P_2O_5), the highest oxide of phosphorus. The products of the union of oxygen with the other elements, particularly the binary compounds, are called oxides, as the oxides of the metals, like lime or oxide of calcium, potash or oxide of potassium, and litharge or oxide of lead; and the oxides of the non-metallic elements, as the oxides of nitrogen, like nitric oxide and nitric acid. (See NITROGEN.) The various oxides will be found under the heads of the elements of which they are formed. (See also OXIDES.)—Although, as has been remarked, oxygen is not necessary, as Lavoisier supposed, to the production of an acid, yet there is no non-metallic body which is so widely associated with the production of acid properties in compounds. In the various proportions in which a metal combines with oxygen, those compounds containing the smallest proportions are not acid, but act the part of bases, while the more highly oxidized compounds are acid. This is illustrated in the various oxides of manganese and iron. (See MANGANESE.) In the different proportions in which it combines with nitrogen similar results are seen. (See NITROGEN.)—One of the important applications of oxygen gas is its employment as one of the elements in the oxyhydrogen blowpipe, which, with the exception of the galvanic battery, yields the highest known degree of artificial heat. The ordinary mouth blowpipe test, by which a small button of metal may be oxidized or deoxidized, according as it is placed in the outer or the inner flame, or placed upon charcoal, or mingled with an oxidizing flux, depends upon the agency of oxygen (see BLOWPIPE); and the process of cupellation depends upon the same principle. In these operations nitrate of potash (K_2NO_3) is often used with advantage for this purpose.—The wide range of affinity possessed by oxygen is evidenced by the important part it plays in the processes of chemical analysis and synthesis, and in the changes which take place during decay and fermentation, as well as in the phenomena of life in plants and animals. (See EREMACAUSIS, and FERMENTATION.) Eremacausis is a process of slow oxidation. Oxygen is one of the most important supporters of animal life, and was therefore called by the older chemists vital air. In fermentation oxygen plays an active part in the de-

velopment of yeast and the oxidation of gluten; the transformation of starch into glucose, and of glucose into alcohol; also the further change of alcohol into acetic acid. The function of animal respiration is a process by which the absorption of atmospheric oxygen by the blood is brought about in the capillaries of the lungs, in consequence of its affinity for a constituent of the blood globules, possessing the property, according to recent experiments of Hoppe-Seyler and Stokes, of absorbing an additional quantity of oxygen in a state of loose combination, by which the blood changes from a purple to a scarlet hue, and of again yielding it up to the tissues in the performance of their function of assimilation and elimination. This constituent of the blood globules is called by Hoppe-Seyler hæmoglobine, and when in combination with oxygen oxy-hæmoglobine. Prof. Stokes calls it, in its two conditions, purple cruorine and scarlet cruorine. The performance of the functions of the nervous system is dependent upon the presence of oxygen in the blood, its deficiency causing an accumulation of carbonic acid and a state of coma. Respiration also includes the elimination of carbonic acid in the animal; but in the plant, under the influence of sunlight, the absorption of carbonic acid, the fixation of carbon, and the elimination of oxygen. The action of gunpowder depends upon the weak combination of the oxygen element of nitre with nitrogen, and its strong affinity for other ingredients of the compound, as charcoal and sulphur, a union with which, at least with the charcoal, and a separation from the nitrogen, causes the evolution of an abundance of elastic gases. The drying of linseed oil and the hardening of paint is a process of oxidation, and could not take place without oxygen. The process of bronzing the surfaces of metals usually consists either in oxidizing them, or in spreading on them another metallic compound which will undergo oxidation by exposure to the air. The action of sunlight on salts of silver causes them to decompose and the silver to become converted into black oxide; and photography, in one of its modes, depends upon the fixation of oxide of silver upon paper or other material. (See OZONE.)

OYER (law Fr., a hearing, from Lat. *audire*, to hear). When one party declares on or otherwise pleads a deed, and founds his claim or rests his defence upon it, he must generally make *profert* of it, or in other words must aver in his pleadings that he produces the said deed in court. In practice, under a system of written pleadings, the production does not take place unless demanded by the adversary party, which is done by serving a written notice that he craves *oyer*. The party who has made *profert* then regularly grants *oyer* by giving a copy of the instrument, and this enables the opposite party to set it forth in his subsequent pleadings, and raise upon it any question which he may think of service to him in the

case. It is only in this way that the deed is spread upon the record. If a party who regularly should make *profert* is unable for any reason to produce the instrument, he should not make *profert*, but should set forth in his pleading the facts which excuse it; for if *profert* is made, *oyer* must be granted when demanded, or judgment may be entered up for the want of it. *Oyer* is not requisite in the case of unsealed instruments, or records; but an executor or administrator who brings suit in his representative capacity must make *profert* of the letters which are the foundation of his right to sue.

OYER AND TERMINER, the technical name of the commission by virtue of which the judges in England take cognizance of and try criminal offences. The words were used in the commission when it was written in Norman French; and in English the authority is to "inquire, hear, and determine." In the United States courts for the trial of criminal causes have sometimes been designated courts of *oyer* and *terminer*, but the authority is conferred by statute and not by special commission.

OYSTER, a marine acephalous mollusk, of the lamellibranchiate order and genus *ostrea* (Linn.). The shells are very irregular, inequivalve, and lamellated, the right or upper shell being the smaller and flatter and moving forward with age, leaving a lengthening groove for the ligament exposed along the beak of the adhering valve, which is the left and lower, the deeper, and more capacious, and attached to foreign bodies by a calcareous growth from the shell itself. The shells are so variable in surface and shape that it would be difficult to describe them, and for the same reason it is almost impossible strictly to define the limits of the species; there is only one adductor muscle to hold the valves together, and the small ligament at the hinge is inserted into a little depression on each side, without teeth or projecting plates. The animal is very simple; the mantle has a double fringe, and its lobes are widely separated, united only near the hinge; there is no vestige of foot; respiration is effected by means of vascular gills or membranous plates attached to the inner surface of the mantle, to which water is brought by the ceaseless action of vibratile cilia; the mouth is jawless and toothless, but is provided with short labial processes separate from the gills for selecting food, consisting of minute particles brought to it by the respiratory currents; the intestine is comparatively short, with a few convolutions; the ventricle of the heart lies upon the rectum. By most writers oysters have been considered hermaphrodite, but according to Siebold and others they are of separate sexes, though the females vastly preponderate, and are ovoviviparous; they are sensible of light, as is known by their closing the valves when reached by the shadow of an approaching boat, and have numerous short, pedunculated, yellowish brown eyes between the

fringes for more than a third of the length of the mantle. The adult oyster has no power of locomotion, and the only signs of vigorous movements are in the expulsion of the respiratory currents, the excrements, and the sperm or ova by the sudden closing of the valves and



Oysters at different Stages of Growth.

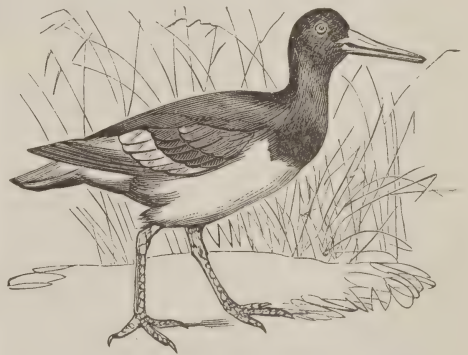
the contraction of the mantle; but it is said they can turn themselves if placed upside down, and the sensibility of the fringes and labial processes is acute. The eggs are expelled in a white, greasy, viscid fluid, called "spats" by the fishermen, which adhere to submarine bodies, and to each other, by their development forming the immense banks found upon some coasts, the old ones being destroyed by the pressure of the new; fecundation is effected through the medium of the water, which conveys the sperm to the ova; the eggs are to a certain extent developed within the cavity of the mantle about the gills; to this cavity also the floating ova of some of the smaller crustacea gain access, and here the little, soft, yellowish white crab (*pinnotheres*) is often developed to a considerable size; this last is a parasitic inhabitant of the oyster shell, and is not a portion of its food, as the softness of the mouth of the latter does not admit of its attacking any resisting substance. Oysters are found in almost all seas, usually in from two to six fathoms of water, and never at a great distance from the shore; they are especially fond of tranquil waters or the gulfs formed by

the mouths of great rivers; they cannot live in fresh water, but some species remain dry during the greater part of every tide; the tree oysters (*O. parasitica* and *polymorpha*), which attach themselves to mangrove and other bushes in the tropics, enclose within the shells a sufficient quantity of water to keep up the respiratory currents; this faculty, possessed more or less by all the family, renders practicable their transportation to great distances. They have been highly esteemed as food from the times of the Greeks and Romans to the present day; they are of easy digestion, but not very nutritious, and act rather as a provocative to appetite than as satisfying food; they are eaten all the year round, except in the months of May, June, July, and August, which is the spawning season; and they are good even then. The common oyster of Europe (*O. edulis*, Linn.), abundant on the coasts of Great Britain and France, occurs in large banks or beds, sometimes extending for miles, usually on rocky bottoms; from about the middle of August to the middle of May they are dredged from the bottom by a kind of iron rake drawn by a boat under full sail, several hundreds being taken at a single haul; these are transferred to artificial beds or parks, where they are preserved for sale, continually growing in size and improving in flavor. The growth of the oyster is slow, it being only as large as a half dollar at the end of four to six months, and twice that size at the end of a year; in artificial beds the growth is usually slower, the full size not being attained till the fifth to the seventh year. The west coast of Scotland and the Hebrides have the best oysters of the British coasts, and here in sheltered bays they acquire the green color so esteemed by the epicure, and supposed to be due to conserva and similar colored growths in the breeding places; other English beds extend from Gravesend on the Thames along the Kent coast, and in the estuaries of the Colne and other rivers along the Essex coast. The British beds are kept up by careful culture and by the introduction of broods from all quarters; since 1872 several varieties of American oysters have been introduced, but the planting is still an experiment, and it is said that the change of sea deteriorates their quality. Not many years ago the beds of France were nearly exhausted; in 1858 M. Coste recommended plans for their restoration, and since then the parks in the bays of St. Brieuc and Arcachon, and the isle of Ré, restocked by broods from Cancale and other sources, have become enormous; and the successful culture is yearly extending along the entire Atlantic and Mediterranean coasts of France. The Danish coast is well supplied with beds. The Neapolitan lake Fusaro is the great oyster park of Italy.—The species most esteemed in America are the Virginian oyster (*O. Virginiana*, Lister) and the northern oyster (*O. borealis*, Lam.). In the *O. Virginiana* the shell is elongated and narrow, and the beaks

pointed and not much curved; the surface of the smaller and upper valve when not worn presents everywhere leaf-like scales of a leaden color, and a lengthened pyramidal hinge ridge along the beak; the muscular impression is nearly central, and of a dark chestnut or violet color; it often measures 12 to 15 in. in length, but is rarely more than 3 in. wide. This is the common oyster from Chesapeake bay southward; it is sometimes found in the vicinity of Boston, and also at the mouth of the river St. Lawrence; it multiplies so rapidly on some of the low shores of the southern states as to offer impediments to navigation, and to change the course of tidal currents. In the *O. borealis* the shell is more rounded and curved, with the beaks short and considerably curved; the surface is very irregular, presenting loosely arranged layers of a greenish color, with the margins more or less scalloped; the muscular impression is dark violet, and the interior chalky or greenish white; a common size is 5 or 6 in. long, but it grows to the length of a foot and to a width of 6 in. This is the common New York oyster, said also formerly to have been abundant in Massachusetts bay. Boston market is supplied principally from artificial beds derived from the Virginia and New York oysters; the flats in the vicinity of our large maritime cities are generally thickly beset with poles, indicating the localities of oyster beds. The principal sources of supply are the Chesapeake bay, the coast of New Jersey, and Long Island sound. Formerly the northern beds were almost wholly kept up by restocking them with seed oysters from Chesapeake bay and from the Hudson river; but of late years the spat is secured at spawning time, and new ground in the vicinity is brought under cultivation, till the area of oyster beds in Long Island sound is now computed by miles rather than by acres, and it is yearly extending. With constantly improving methods of culture, means are also devised for protecting the oyster to some extent from its natural enemies, and for transporting oysters to the remotest parts of the country. No trustworthy statistics can be given of the oyster area or annual product, or the amount of money invested, or number of men and vessels engaged in the business; the wholesale trade of New York alone is estimated at \$25,000,000 a year, and that of Chesapeake bay is probably nearly as great.—More than 60 species of oysters are described in various parts of the world; those of tropical climates have generally a less delicious flavor than the natives of temperate zones. About 200 species of fossil oysters, from the time of the ammonites to the present epoch, are known. The family *ostreidae*, of which the oyster is the type, contains also the genus *anomia*, translucent, pearly white within, attached to rocks and weeds by a calcareous plug passing through a hole or notch in the right valve, the same species presenting a great variety of shapes from acquiring the form of

the surface to which they are attached. Allied genera are *placuna*, like the *P. sella* or Hungarian saddle, and *P. placenta* of the Chinese seas, so transparent as to be used for glass in windows; the *pecten* or scallop shell; and the *spondylus* or thorny oyster. The pearl oyster is *avicula margaritifera*, belonging to another family. (See PEARL.)

OYSTER CATCHER, a wading bird of the genus *hematopus* (Linn.). The bill is twice as long as the head, and is strong, straight, much compressed, sharp-edged, and truncated at the end; wings long and pointed, with the first quill the longest; tail moderate and even; tarsi strong, covered with reticulated plates anteriorly; toes strong, enlarged on the sides by a thickened membrane, and the middle united to the outer by a basal membrane; hind toe wanting; claws strong, broad, and slightly curved. There are about a dozen species, distributed in most parts of the world; they are either solitary, or occur in small flocks on the seashore or salt marshes, feeding on various bivalve mollusks, crustaceans, marine worms, and small fish; they also suck sea urchins (*echini*). They migrate in large flocks, and the flight is swift, strong, and long sustained; they are also good runners, swimmers, and divers. The American oyster catcher (*H. palliatus*, Temm.) is 17½ in. long and 3 ft. in alar extent; in the winter plumage the body above is light ash brown, darker on the rump; the upper tail coverts and wide diagonal band on the wing white; under parts white; bill and lids bright orange red; legs pale reddish; the sexes are alike; the summer plumage is much darker. This species is found on the Atlantic coast from Labrador to Florida, never far inland or away from the salt water; it is very shy and vigilant; it goes north in the spring to breed, returning in October; the nest is



American Oyster Catcher (*Hematopus palliatus*).

made without care on the shingly beach in the scanty herbage above high-water mark, in the sand or in the marshes; the eggs are four, 2½ by 1½ in., pale cream-colored, with spots of brownish black and paler tints; the cry is loud, like the syllables "wheep, wheep, wheep;"

the flesh is dark and tough, and not fit for food. The pied oyster catcher or sea pie (*H. ostralegus*, Linn.) of Europe much resembles the American bird, but is smaller, and has the bill less deep at the bulging part, less sharp-pointed, and proportionally shorter; it has similar habits, and may be readily domesticated.

OYSTER GREEN, a name given to marine algae of the genus *ulva*, which are also called green laver and sea lettuce. The ulvas belong to the chlorospermous class of seaweeds, distinguished by their green spores, and the generally green color of their fronds. There are several species of *ulva* common to both shores of the Atlantic, the most abundant on our coast being *U. latissima* and *U. lactuca*; they are from 3 in. to 2 ft. long, and 3 to 12 in. broad, often sinuous on the margin, and wavy or plaited; they are very thin, smooth, and glassy, and appear like very fine bright green silk. The plants are very common on oyster beds, and are frequently used by dealers to decorate their heaps of oysters. The plant is the most valuable seaweed for a salt-water aquarium, it being one of the few that will thrive and give off oxygen in the quiet waters of a marine tank. Among the seaweeds eaten in Europe, under the impression that they have some antiscorbutic properties, is the true laver, the related *porphyra*; and the ulvas are eaten raw, with lemon juice, as green laver. In Scotland they are sometimes used as a remedy for headache, being bound over the forehead.

OYSTER PLANT, one of the names for *tragopogon porrifolius*, which is also called salsify (Fr. *salsifis*). The genus *tragopogon* (Gr. *τράγος*, a goat, and *πύγων*, beard) belongs to that division of the composite family (*ligulifloræ*) which includes the dandelion and the lettuce; the species *porrifolius* (leek-leaved) grows spontaneously in England and on the continent, but is supposed to have been introduced from the Mediterranean region. With us it is known only as a garden vegetable, and its use has increased remarkably within a few years. It is a biennial, with a tapering root 10 to 14 in. long and rarely more than an inch in diameter at the top; the leaves, a foot or more long, are narrow and tapering upward, of a dull green; the second year flower stalks 3 to 5 ft. high are thrown up, which branch above, each division being terminated by a large head of purplish flowers; the akenes (popularly seeds) are about an inch long, marked with furrows, and terminated by a slender beak about their own length, bearing at the top a pappus of plumose hairs. The cultivation of salsify is precisely that of carrots and similar roots, but being smaller it is thinned to stand 4 or 5 in. apart; it requires a deep, rich soil, which should have been manured the year before. It is perfectly hardy, and, like parsnips, only the portion required for use during the winter need be dug in the autumn. To obtain seeds, the finest roots are set out in spring and treated like those of similar plants. Oyster plant is

cooked in various ways: it is made into soup in imitation of oyster soup, which it resembles in flavor; it is cut into inch pieces and stewed and served with white sauce; or it is boiled and then dipped into butter and fried whole, or mashed and made into balls, which are treated in the same manner. The root abounds



Oyster Plant (*Tragopogon porrifolius*). 1. Flower. 2. Root.

in a milky juice, which becomes dark-colored on exposure to the air; in preparing it for cooking, each root as it is scraped is thrown into water to prevent discoloration.—Black oyster plant or black salsify is *scorzonera hispanica*, a closely related plant, which has broader



Black Oyster Plant (*Scorzonera hispanica*).

leaves and yellow flowers; the root, shaped like that of the preceding, is covered with a blackish skin, but internally is quite as white. It is cultivated in the same manner as the other, and is put to the same uses; its flavor is preferred by many.—Spanish oyster plant is *scolymus hispanicus*, closely related to the thistles. It has large prickly leaves, a foot or more long, with white blotches; its flowers, which are in thistle-like heads, are orange yellow. The roots are very white, 12 or 15 in. long, an inch or more in diameter at the crown, very brittle, and abound in a milky juice; they are used the same as

the preceding, but usually have a hard centre, which must be removed after the root is boiled.

OZAKA, a city of Japan, in the S. W. part of the main island, on and near the mouth of the Yodogawa, 25 m. S. W. of Kyoto; pop. in 1872, 530,885. It is one of the three *fu* or imperial cities, and is in a vast and highly productive

plain intersected by several streams. Its front is protected by a castle and two forts garrisoned by about 7,000 men. The streets are narrow and clean, and cross at right angles, dividing the city into blocks of uniform size. The numerous canals are crossed by more than 1,000 bridges of wood and iron. The houses, mainly two stories high, are built of wood, lime, and clay. Among the public buildings are the municipal hall, an imposing structure crowned with a dome, and the imperial mint, erected in 1870 and equipped with the finest machinery and presses. There are 1,380 Buddhist temples, 538 Shinto shrines, and two native Christian churches, a government college, 72 public schools, an academy, and a girls' school with foreign teachers. Theatres and other places of amusement abound and are well patronized. In the government arsenal guns of the largest calibre are cast, and all kinds of military accoutrements are made. Since the opening of the

seilles, Sept. 8, 1853. He was the son of a physician who practised for some time in Italy. He studied philosophy at the college of Lyons, went to Paris in 1831 to study law, and in 1833 was one of eight students who formed a charitable association which laid the foundation of the society of St. Vincent de Paul. He took his degree in 1836, and in 1839-'40 was professor of mercantile jurisprudence at Lyons. Subsequently he assisted Fauriel in teaching foreign literature at the Sorbonne, and in 1844 succeeded him as professor. His *Dante et la philosophie catholique au treizième siècle* (Paris, 1839; enlarged ed., 1845) has been translated into English and Italian; and his *Études germaniques pour servir à l'histoire des Francs* (2 vols., 1847-'9) obtained the great Gobert prize. He was prominent as an ultramontane writer. A complete edition of his works appeared in 1855, in 8 vols.



Castle of Ozaka.

port and the establishment of foreign warehouses in 1868, Ozaka has rapidly become of great commercial importance. In 1872 the total number of vessels entered at the ports of Ozaka and Hiogo was 258 (including 119 from the United States), of 277,127 tons; cleared, 240, of 256,026 tons; estimated value of imports, \$10,432,591; of exports, \$13,590,846. The introduction of foreign machinery, largely from the United States, has been very general, and the manufactures of all kinds are extensive. Large breweries, using American hops, have been established, and produce beer rivalling the saké for which the place has long been famous. Telegraphs connect with the leading cities of the empire. A railway, completed in 1874, unites Ozaka with Hiogo, 20 m. W., and is to be extended to Kioto and around Lake Biwa to the W. coast.

OZANAM, Antoine Frédéric, a French author, born in Milan, April 23, 1813, died in Mar-

OZARK, a S. county of Missouri, bordering on Arkansas, intersected by the North fork of White river, and watered by other branches of the same stream; area, about 700 sq. m.; pop. in 1870, 3,363, of whom 12 were colored. Its surface is hilly and covered with large forests of pine, and the soil in the valleys and bordering streams is fertile. The chief productions in 1870 were 121,724 bushels of Indian corn, 9,537 of wheat, 7,143 of oats, and 18,613 lbs. of tobacco. There were 949 horses, 806 milch cows, 1,734 other cattle, 2,122 sheep, and 6,236 swine. Capital, Gainesville.

OZARK MOUNTAINS, a range commencing on the Missouri river, in Missouri, between the Gasconade and Osage rivers, and extending S. W. across the N. W. corner of Arkansas into the Indian territory, terminating near the Red river. They are a series of hills occasionally rising to a height of 1,500 or 2,000 ft. In Arkansas the range throws off two spurs toward the east, the Boston mountains or Black hills N. of the Arkansas river, and the Washita or Masserne range S. of it.

OZAUKEE, a S. E. county of Wisconsin, bordering on Lake Michigan, and drained by Milwaukee river and Cedar creek; area, 288 sq. m.; pop. in 1870, 15,564. It has a rolling and heavily timbered surface and fertile soil. The Milwaukee, Lake Shore, and Western railroad passes through it. The chief productions in 1870 were 314,273 bushels of wheat, 72,017 of rye, 28,805 of Indian corn, 258,442 of oats, 36,520 of barley, 84,349 of potatoes, 395,003

lbs. of butter, 15,897 of wool, and 14,726 tons of hay. There were 3,690 horses, 5,641 milch cows, 4,630 other cattle, 5,482 sheep, and 5,820 swine; 1 manufactory of machinery, 1 of woollen goods, 3 tanneries, 7 flour mills, 5 saw mills, and 6 breweries. Capital, Ozaukee.

OZOLIAN LOCRIANS. See LOCRI.

OZONE (Gr. *ὄζων*, to smell), an allotropic and particularly active condition of oxygen. Van Marum, toward the end of the last century, while experimenting with a powerful electrical machine, made the first observations on ozone, noticing its peculiar smell and its power of attacking mercury. His discovery attracted no attention for more than half a century, when Schönbein, who first satisfactorily investigated the subject, presented in 1840 a paper to the academy of Munich. He found that in the electrolysis of acidulated water the gas collected at the positive pole had a peculiar odor, like that observed during the passage of a spark from the common electrical machine, or which accompanies a flash of lightning. The gas was found to be oxygen, but with new properties added to it, in consequence of its assuming an allotropic condition. (See ALLOTROPISM.) He found soon after that the slow oxidation of phosphorus in moist air or oxygen was followed by the appearance of the same body, which was named ozone. Marignac and De la Rive obtained it by passing electric sparks through perfectly dry oxygen. They found, however, that dry air or oxygen did not become converted into ozone by the action of dry phosphorus. According to De Luca, the oxygen which is evolved by the action of light upon growing plants contains ozone. Schönbein and Phipson have observed that air in contact with juice of fungi becomes changed to ozone; and the latter is of opinion that the processes of fermentation, putrefaction, and decay are always accompanied by the formation of ozone.—Ozone may be conveniently prepared by any of the following processes: 1. By placing two or three sticks of moist phosphorus in a bottle of air or oxygen. In an hour or two the presence of ozone will be manifest by its smell. The sticks of phosphorus may then be taken out, and the ozone washed with water to remove the phosphorous acid with which it is contaminated. This method may be varied by passing a current of moist air through a series of Woulfe's bottles containing sticks of phosphorus, the last bottle containing no phosphorus, but water or a dilute alkaline solution. 2. By subjecting to electrolysis a mixture, according to Andrews, of one volume of sulphuric acid with three of water. According to Baumert, the mixture is more productive when strongly acidulated with both chromic and sulphuric acids. The apparatus used by Dr. Andrews is shown in fig. 1. "It consists of a bell jar, *a*, or glass cylindrical vessel, open below and contracted to a neck above, which is suspended in a round cell, *b b'*, of porous earthenware, leaving a space of

two inches between its lower edge and the bottom of the porous cell. The whole is placed in a glass jar, *c c'*, of somewhat larger dimensions than the cell; a bundle of platinum wires, *p*, suspended below the bell jar serves as the positive pole, and a broad ribbon of platinum, *n n'*,

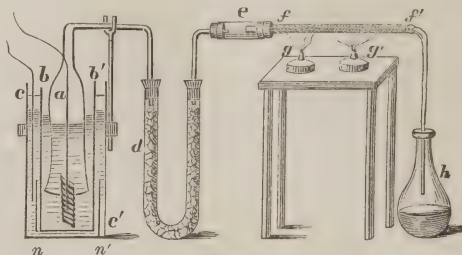


FIG. 1.

placed between the outer glass jar and the porous cell as the negative pole of a voltaic arrangement of three or four couples. A delivery tube hermetically united to the neck of the bell jar conveys the mixture of oxygen and ozone disengaged at the positive pole to a sulphuric acid drying tube, *d*. From this the gas passes through the connecting tube *e*, and thence to the other tubes for the purpose of illustrating the properties of ozone. Thus, in the figure it is represented as traversing a tube of hard glass, *f f'*, covered with fine wire gauze, and terminating near the surface of mercury contained in the flask *h*. So long as the gas is heated strongly as it passes through the tube *f f'* by the spirit lamps *g g'*, not the slightest change is produced upon the mercury (in consequence of ozone being decomposed by heat); but when the lamps are removed and the tubes allowed to cool, the mercury is rapidly attacked." The oxygen collected at the positive pole contains about $\frac{1}{30}$ of its weight of ozone. 3. By the slow oxidation of ether, oil of turpentine, and other essential oils. In 1850 Schönbein found that if a small quantity of ether is poured into a jar, and a clean glass rod heated to about 500° F. is introduced, the presence of ozone is manifested by the usual tests. 4. By transmitting a current of oxygen through a tube into which a pair of platinum wires is sealed, having their points a small distance apart, and connecting one of the wires



FIG. 2.

with the prime conductor of an electrical machine and the other with the ground. 5. A method devised by Siemens employs induction. A long glass tube, fig. 2, has its interior coated with tin foil; a larger tube coated on the exterior with tin foil is passed over the smaller

one, leaving a space between the two, through which a current of pure dry oxygen is passed. This becomes electrified by induction by connecting the two coatings with the terminal wires of an induction coil. It is said that by this means from 10 to 15 per cent. of the oxygen may be converted into ozone. Schönbein regarded ozone as permanently negative oxygen, and he also entertained the opinion that there was a permanently positive oxygen, which he termed antozone. The idea of the existence of these two distinct varieties was founded on certain differences of behavior of oxygen, according as it was obtained from alkaline peroxides or from the peroxide of manganese or of lead; that obtained from the alkalies having a reducing, that from the manganese and lead oxides an oxidizing action. But according to the experiments of Von Babo, Sir Benjamin Brodie, and others, it is probable that Schönbein's so-called antozone is the peroxide of hydrogen of Thénard.—*Properties.* Ozone is insoluble in water, alcohol, and ether, although M. Carius asserts that 100 volumes of water will absorb about 0.5 volume of the gas. Its specific gravity is greater than that of oxygen in the proportion of 3 to 2. Air containing ozone has an irritating action upon the lungs when breathed, and when large quantities are present death may be produced. Experiments made by Dr. Redfern of Queen's college, Belfast, show that the inhalation of oxygen containing only $\frac{1}{200}$ of its volume of ozone is rapidly fatal to all animals, while the gas freed from ozone is comparatively harmless. Ozone causes death by producing intense congestion of the lungs, with emphysema and distention of the right side of the heart with blood. From experiments of Mr. Dewar and Dr. McKendrick it appears that atmosphere highly charged with ozone diminishes the number of respirations per minute, lessens the strength of the cardiac pulsations, and lowers the temperature from 5° to 8° F. The blood is found after death in a venous condition. Ozone is an exceedingly powerful oxidizing agent, corroding cork, paper, animal membrane, caoutchouc, and other organic substances, and rapidly oxidizing iron, copper, mercury, and moist silver. M. Houzeau (*Comptes rendus*, 1872) states that a considerable quantity of it agitated with alcohol causes rapid oxidation, oxygenated water being at the same time produced; and he recommends its employment in a concentrated form as an oxidizing agent in organic chemistry. An extended series of experiments have since been made by Prof. A. W. Wright of Yale college, to ascertain whether ozone could be advantageously used in the production of acetic acid from alcohol. It was obtained in a variety of ways from alcohol and ether, but not so rapidly as might be expected from M. Houzeau's statement. ("American Journal of Arts and Sciences," March, 1874.) Ozone acts upon organic substances in various ways. Vegetable

colors are bleached or altered. Blue litmus is bleached without being first reddened, and the color of sulphate of indigo is discharged when the liquid is agitated with ozone. The processes of bleaching, either the old one of exposing the goods to moisture and sunlight, or the modern one of acting on them with chlorine, depends upon the production of ozonized air, or at least upon the production of nascent, active oxygen. Indeed, it is not improbable that when oxygen combines with a substance it passes into the molecular condition of ozone, either during the act of union or immediately preceding it. When the affinities are strong, as in the case of phosphorus, an atmosphere of ozone may be produced, surrounding the oxidizing body; but in the case of weaker attractions, no sensible evolution of ozone takes place. The most delicate test for ozone is to expose to its action a strip of paper moistened with a mixture of starch and iodide of potassium, by which the salt becomes decomposed, and the liberated iodine unites with the starch, forming the characteristic blue compound, iodide of starch. It has been supposed that the fact that a paper prepared in this way and exposed to the atmosphere often becomes blued, indicates the presence of ozone; but this conclusion is not justified, because other agents, especially oxide of nitrogen, will also produce the same effect. Schönbein, having found that the air of the country frequently colored delicate ozone test paper, inferred that this body is a normal constituent of the atmosphere, varying in quantity in different localities and under different circumstances; and with its presence or absence he attempted to connect certain catarrhal diseases. Dr. Andrews has prosecuted an extended series of experiments, which, among other conclusions, sustain Schönbein's opinions in regard to the frequent presence of ozone in the air, but not those in regard to its connection with diseases. Ozone is easily decomposed, or reconverted into common oxygen. It is destroyed by the dust and exhalations of cities, and in general by all matter in a condition to become easily oxidized. It is found in the greatest proportion in the air of mountains, and at the seaside. An elaborate report made by Ebermeyer in 1873 on the physical influence of forests, says that in open fields the air is richest in ozone, and in general in places of great atmospheric moisture. In a forest there is more ozone in the upper stratum of air in the branches of the trees than near the ground, owing to the fact that ozone is absorbed by the decaying matter on the ground. During a fog the quantity of ozone is small, and also during bright weather and northerly winds; a change to southerly winds and rains increases the quantity, and the air is rich in ozone during thunder and snow storms. The assertion that an outbreak of cholera is accompanied with an absence of ozone seems not to be sustained, although such absence is regarded by Dr. Andrews as indicating that the air is adulterated.

P

P, THE 16th letter and the 12th consonant of the English alphabet. It is the leading or most prominent of the labial mutes, and is pronounced by closely compressing the lips until the breath is collected and then letting it issue. P is frequently interchanged with B, and in English words of Teutonic origin corresponds as a rule to B in the root. The exceptions to this rule are very numerous, however, as Eng. *sleep*, Anglo-Saxon *slapan*, Mæso-Gothic *slepan*; and on the other hand, when P occurs in words of Greek or Latin derivation, it is found to be the same in the original language; thus, Eng. *paternal*, Lat. *pater*, Gr. *πατήρ*. The dialects of upper Germany frequently pronounce B as P, and those of lower Germany make the contrary change. In Runic writings the character representing the sound of P is almost identical with our B. The undoubtedly pure sound of P is found in none of the Semitic languages except the Ethiopic, its representative in Arabic, Hebrew, and Syriac partaking more of the *ph* or *f*. It is common in Chinese. Besides *b* and *f*, this letter is also interchangeable with *m*, *v*, *pf*, *c*, *k*, *q*, *t*, and *pt*. Followed by *h*, it is equivalent to the Greek *φ*, and pronounced *f*, as in *physic*. In some words borrowed from the Greek, as *psalm*, it is silent in English, though sounded in Greek (where it forms with *s* a single character, *ψ*) and other languages.—As an abbreviation in Latin inscriptions, P. stands for *Publius*, *proconsul*, *pontifex*, *pious*, *perpetuus*, *patronus*, *pedes*, *pondo*, *posuit*, *ponendum*, *post*, &c. P.P. signifies *pater patriæ*, *pro prælore*, *præpositus*, *primipilus*; P.C., *patres conscripti*. In numismatics, it is the mark of ancient coins struck at Dijon. The numerical value of P among the ancients has been variously explained. As the initial letter of *πέντε* it seems at first among the Greeks to have indicated 5; afterward it denoted 80. Among the Romans, according to Baronius, it stood for 7; but according to Ugucchio it was equivalent to C, 100, and according to others to G, 400, or with a horizontal mark over it to 4,000, 40,000, or 400,000.

PAALZOW, Henriette von, a German novelist, born in Berlin in 1788, died there, Oct. 30, 1847. Her family name was Wach, and she married a Prussian officer, from whom she was separated. She acquired fame by her anonymous *Godwie Castle* (Breslau, 1836; 5th ed., 1849) and *St. Roche* (1839; 3d ed., 1843). A complete edition of her novels has been published, together with *Briefe an ihren Verleger* and her biography (36 vols., Berlin, 1855; new ed., Stuttgart, 1874 *et seq.*).

PACA, a rodent of the agouti family, the only well determined species of the genus *cælogenys* (Ill.). In this genus the zygomatic arch is enormously developed, the superior maxilla-

ry portion presenting a large hollow beneath, giving the skull somewhat the appearance of a snapping turtle's; the outside of the arch in the male is wrinkled and roughened with small wart-like confluent excrescences, growing rougher with age; the malar bone is deeper than long; the molars are longer than broad, the crowns having four or five deeply indenting folds of enamel, and the incisors are slender. The *C. paca* (Rengg.) is about 2 ft. long, stout-bodied, with short limbs; the head is large and broad, with an obtuse hairy muzzle; the eyes large; the ears moderate and sparingly clothed with hair; feet naked below, five-toed, the inner toe very small, and with broad nails except on the inner; the tail a naked fleshy tubercle. The hair is coarse, closely ap-



Paca (*Cælogenys paca*).

plied to the skin, of a brown color on the upper parts and limbs, and white below; three, four, or five longitudinal white bands on the sides, broken into spots; in some specimens the color is blackish brown above and yellowish white below, and in others more rufous. The mammae are two pairs, one pectoral, the other inguinal. The zygomatic cavity is lined by a continuation of the skin of the face, and opens externally on the cheek; its use is not well ascertained; beneath this is a cheek pouch, opening into the mouth in front of the molars. They inhabit South America from Cayenne to Paraguay, and are sometimes found in Peru east of the Andes, and in some of the West Indian islands. They are generally seen singly or in pairs on the borders of the forests and rivers after sunset, remaining concealed during the day in burrows which they dig like rabbits; the food consists of leaves, fruits, and tender plants, and sometimes sugar cane and melons; they are good runners, swimmers, and divers;

cleanly in habit, the flesh is fat and well flavored. A fossil species is found in the caves of Brazil.

PACA, William, a signer of the Declaration of Independence, born in Harford co., Md., Oct. 31, 1740, died in 1799. He graduated at the college of Philadelphia in 1759, was admitted to the bar in 1764, settled in Annapolis, and in 1771 was chosen to the provincial legislature. He was a conspicuous opponent of the government, was appointed by the legislature to attend the first congress in 1774, and was elected to congress in 1775, 1776, and 1777. On the adoption of the constitution of his native state he was made state senator for two years. He was chief judge of the superior court of Maryland from 1778 to 1780, when he became chief judge of the court of appeals in prize and admiralty cases. In 1782 he was elected governor of Maryland. In 1786 he sat in congress, and was reelected governor. He served in the state convention that ratified the federal constitution, and in 1789 was appointed judge of the district court of the United States for Maryland, which post he held till his death.

PACCARD, Alexis, a French architect, born in Paris, Jan. 19, 1813, died there in October, 1867. He was a son of the actor and writer Edme Jean Paccard, and studied in the school of fine arts and under Huyot and H. Le Bas. The great prize which he obtained in 1841 for his "Palace of an Ambassador in a Foreign Country" enabled him to spend several years in Rome and Athens. After his return to Paris in 1847 he became inspector and architect of public buildings, and in 1853 architect to the museum of Fontainebleau. In December, 1863, he was appointed professor of architecture in the school of fine arts. He published the "Parthenon of Athens" (1855), the first attempt in polychromic restorations.

PACCHIONI, Antonio, an Italian anatomist, born in Reggio about 1665, died in Rome in 1726. He was associated at an early period with Malpighi in the practice of medicine, but soon devoted himself to anatomy, in which he made many original researches, particularly upon the brain and its membranes. Some of his conclusions with regard to the structure of these parts, especially as to the muscular nature and sensibility of the dura mater, proved erroneous, but he still justly deserves great credit as an original investigator. His name is perpetuated in the anatomical designation of the *glandulæ Pacchioni*, small rounded bodies, composed of fibrous and elastic tissue, found adhering to the membranes of the brain along the course of the great longitudinal fissure. These bodies were described by him, from their external appearance and connections, as conglobate lymphatic glands, the science of microscopic anatomy not being at that time sufficiently advanced to enable him to recognize their intimate structure. His principal works are: *De Dura Matre Disquisitio anatomica* (Rome, 1701); *Dissertatio epistolaris de Glandulis*

conglobatis Durae Meningis Humanae, indeque ortis Lymphaticis ad Piam Meningem productis (1705); *Disputationes binæ illustrandis Durae Meningis et ejus Glandularum Structuræ atque Usibus concernatæ* (1713); and *Dissertationes physico-anatomicæ de Dura Meninge Humana, novis Experimentis et Lucubrationibus auctæ et illustratæ* (1721). His collected works were published at Rome in 1741 (1 vol. 4to).

PACHA. See PASHA.

PACHACAMAC, Ruins of, the remains of an ancient Peruvian city, covering a large area, seven leagues from the city of Lima, near the modern town of Lurin. It was the sacred city of the supreme divinity of Peru, Pachacamac, and was distinguished for a magnificent temple dedicated to him. Its door was richly incrustated with corals and precious stones. The golden keys of this temple, given by Pizarro to the pilot Quintero, were valued at 4,000 marks.

PACHECO, Francisco, a Spanish painter, born in Seville in 1571, died there in 1654. From an early age he wrote verses in Spanish and in Latin. Until the age of 40 his reputation as a painter was confined to Seville, where he resided. He visited Madrid and the Escorial in 1611, and on his return opened an academy of painting on a more comprehensive scale than had previously been attempted in Spain; among its students was Velazquez, who married Pacheco's daughter. In 1618 he was appointed by the inquisition censor of the pictures exposed for sale in Seville, his chief duty being to see that none representing the nude human figure were sold. One of his regular occupations was the painting and gilding of statues. He passed his latter years in Seville, where his residence became the resort of men eminent in literature and art, and particularly of the Jesuits, to whom he was indebted for copious materials and hints for his *Arte de pintura* (4to, 1649). His paintings are rarely met with out of Spain. His masterpiece is the "Archangel Michael expelling Satan from Paradise," at Seville. Among his most famous works are "Ignatius Loyola" and "The Last Judgment," at Seville, and "The Baptism of Christ," at Granada. He executed several hundred portraits in crayon.

PACHOMIUS, Saint, the founder of the first organized monastic community, born in Upper Egypt in 292, died about 348. He was born a pagan, but about the age of 20, while serving in the army, became a convert to Christianity. As soon as his term of military service expired he placed himself under the direction of a hermit of the Thebaid named Palæmon, and afterward (340) retired to the island of Tabennæ in the Nile, between the nomes of Tentyra and Thebes. His disciples soon became numerous. They occupied different houses, each of which had its superior, and several houses combined formed a monastery, which was ruled by an abbot. The whole body of monks, amounting at times to 7,000,

recognized a common superior. On the opposite bank of the Nile there was a convent for women founded by the sister of Pachomius, and governed by the same rules as those for the men. The rules of Pachomius were translated into Latin by St. Jerome, and are still extant in Lucas Holstenius's *Codex Regularum Monasticarum et Canonicarum* (fol., Geneva, 1769). Several of his letters have also been preserved, and both may be found in Galland's *Bibliotheca Patrum* (1768).

PACHYDERMATA (Gr. *παχὺς*, thick, and *δέρμα*, skin), the name given by Cuvier to a group of herbivorous mammals, generally large and unwieldy, with a thick skin, naked or sparingly covered with hair. Among its living members are the elephant, hippopotamus, rhinoceros, manatee, tapir, hog, and peccary, and among the extinct genera the mastodon, dinotherium, palæotherium, lophiodon, macrauchenia, and toxodon. They are allied to ruminants by the fossil anoplotherium, and to rodents by the hyrax, while the hiatus between the rhinoceros, tapir, and elephant was filled by the extinct lophiodon, macrauchenia, palæotherium, and their allied genera. In the present epoch the genera and species are few, but during the tertiary period they existed under a far greater variety of form and in more northern habitats. In the system of Cuvier the pachyderms included all non-ruminating hoofed quadrupeds, divided into *proboscidea* (elephants), *solidungula* (horse, &c.), and ordinary pachyderms subdivided according to the odd or even number of the hoofs. Wagner makes sections: I., *anisodactyla*, with hoofs in a single series around the bottom of the foot, and with skin usually naked, including the four families of elephant, tapir, hippopotamus, and rhinoceros; II., *zygodactyla*, with two hoofed toes for walking and two others placed higher up, including the hog family; and III., *lamnungia*, with flattened nails instead of hoofs, including the hyrax family. According to Owen's cerebral system (see MAMMALIA), the pachyderms would comprise all the hoofed quadrupeds except the ruminants and solidungulates, with the addition of the sirenoid *multilata*. Van der Hoeven combines the systems of Cuvier and Owen, as follows: order *pachydermata*, with phalanx I., *proboscidea*, with the elephant family; II., *perissodactyla*, with an odd number of toes, with the families *nasicornia* (rhinoceros), *lamnungia* (hyrax), *tapirina*, and *solidungula*; and III., *artiodactyla*, with even toes, including the hog and hippopotamus families. Huxley divides the old pachyderms into *proboscidea*, *hyracoidea*, and the *perissodactyl* and *artiodactyl unguolata*, the latter including the *ruminantia*. Most modern systematists, since Owen, do not use the term, dividing its members among various orders, according to the hoofs and toes. The skeleton is generally massive, indicating great strength but inactive habits; the thoracic cavity is enormous, in proportion to the great bulk and

weight of the viscera; the limbs are robust, though adapted for running in the smaller members like the hog; there are no clavicles; the peculiarities of the skeleton and teeth are given in the articles devoted to the different animals. The stomach is generally simple, and the intestines very long and voluminous, in accordance with the bulky and vegetable character of their food; the brain is well developed, and the complexity of the convolutions ranks them with the subclass *gyrencephala* of Owen, but, with the exception of the hog, below the ruminants and carnivora; the nasal apparatus is richly endowed with nerves, forming a delicate organ of touch, and in some of prehension. They occur in the warmer climates of all parts of the world except Australia, in the present epoch.

PACIFIC, the S. W. county of Washington territory, bordering on the Pacific ocean, and bounded S. by the Columbia river; area, 1,140 sq. m.; pop. in 1870, 738. It is deeply indented by Shoalwater bay, into which flows the Willpah river. The fisheries are a source of wealth, oysters being abundant, especially in the bay. In the valley of the Willpah there is considerable productive land, and a short distance up the Columbia cement rock and silver-bearing veins are found. Cape Hancock (formerly Disappointment) forms the S. W. extremity of the county. The chief productions in 1870 were 550 bushels of wheat, 1,270 of oats, 4,695 of potatoes, 4,950 lbs. of wool, 10,375 of butter, and 386 tons of hay. The value of live stock was \$42,425. Capital, Oysterville.

PACIFIC OCEAN, the largest ocean on the globe, bounded E. by the American continent, N. by the same and by the chain of the Aleutian islands (Behring sea not being properly oceanic in its character), and W. by the chain of continental islands and peninsulas lying off the coast of Asia, the chain of the Melanesian islands, and the continent of Australia. This whole boundary, starting from the S. part of Chili, following up the line of the Cordilleras through Central and North America, the Aleutian islands, and the islands E. of Asia, and continuing it from Papua through the New Hebrides and New Caledonia to New Zealand, is remarkable as being, with some interruptions, the great zone of volcanoes; no fewer than 400, extinct and active, being known on that line. The southern limit, as in the Atlantic and Indian oceans, is an artificial one, the Antarctic circle. The first European discoverer of the Pacific ocean was Vasco Nuñez de Balboa, who on Sept. 26, 1513, saw it from one of the mountains near the isthmus of Darien. It was first traversed by Magalhaens, from the strait bearing his name to the Philippine islands (1520-'21). From him it received its name of Pacific, on account of the constant fair weather which accompanied him during his voyage. It is also called the Great ocean with more propriety, or the South sea, a title now nearly obsolete. The E. or Ameri-

can shore is remarkably uniform and almost unbroken, except by the fiords of Patagonia, British America, and Alaska, and by the gulf of California. The N. and W. shores are broken into innumerable islands, separating its waters from a chain of inland seas, such as Behring sea, the Okhotsk, Japan, and Yellow seas, the E. and S. China seas, and the Banda, Arafura, and Coral seas. This configuration has had a great influence on the migration of the populations, and on the comparatively high and early civilization of some of them, such as the Chinese and Japanese.—The depth of this ocean is not yet known in much detail. By means of the recorded time of transmission to California of the waves produced by an earthquake in Japan, Prof. Bache calculated the depth as between 2,000 and 2,400 fathoms. Another calculation based on the movement of the waves of the great South American earthquake of 1868, by Prof. Hochstetter, gave somewhat less than 2,000 fathoms. The soundings made in 1874 by Com. Belknap in the United States steamer *Tuscarora*, between California, the Hawaiian islands, and Japan, give an average very near Prof. Bache's results, a brilliant confirmation of Prof. Airy's formula on which the calculations were based. The maximum depth is about 3,000 fathoms. Similar depths were found by the Challenger expedition (1874) in the south Pacific, and in the Melanesian, Celebes, and Sooloo seas; in these latter the decrease of temperature with depth ceased at a point of equal depth with the lowest part of the rim of the submarine basin enclosing them, and below this the temperature remained constant; a phenomenon similar to that observed in the Mediterranean. The soundings of the Challenger in the Pacific confirm the observations made by the same party in the Atlantic, viz., that below 2,250 fathoms on an average the *globigerina* deposits are no longer found, the bottom consisting of red clay.—The currents resolve themselves into two systems, as in the Atlantic. The southern one in its general features forms a revolving stream turning from right to left, the northern one revolving in the contrary direction. The former originates in the southwest and south by the combination of the south Australian current, coming from the Indian ocean, with the great antarctic drift. This current moves E., crossing the whole breadth of the ocean toward the coast of South America; before reaching it, it divides into two branches, the northern or current of Mentor trending N. E. until it reaches about lon. 78° W., when it turns W. in a wide sweep to join the S. equatorial current. The southern branch strikes the American coast, gives off the Cape Horn current, passing around that cape into the Atlantic, then runs N., hugging the coast under the name of the Humboldt or Peruvian current, nearly up to the equator, where it turns W. and crosses the whole of the ocean as the S. equatorial current, following

nearly the parallel of 10° S. The Humboldt current, receiving much of its water from the antarctic regions, is cold, and reduces the temperature of the South American coast much below the degree due to the latitude. At the Galápagos islands Capt. Fitzroy found the temperature of the water only 60°, while just outside the group on the north it was 80° in the water coming from the direction of the bay of Panama. The S. equatorial current divides into several branches in the vicinity of the Tonga islands, one of them running into Torres strait, and another along the E. coast of Australia, sweeping round toward New Zealand. A little N. of the equator, a counter current is found running E. across the whole ocean and separating the N. and S. equatorial currents; this is the belt of the equatorial calms. The N. equatorial current strikes the coast of Asia near the island of Formosa, and is deflected N. and N. E., forming the Japan current (Kuro-Siwo or Black stream), the counterpart of the Gulf stream of the Atlantic. It gives off the Kamtchatka current, running up toward Behring strait, but the main body crosses over toward Alaska, carrying warmth and moisture to that country, then runs S. as the coast current of California, and off the coast of Mexico returns into the equatorial circulation.—The trade winds are found to blow with regularity only in that part of the ocean most free of islands. Thus the S. E. trades can be depended on only between the meridians of the Galápagos and Marquesas islands, and between the tropic of Capricorn, or at the most 30° S., and the equator or even a little N. of it. The N. E. trades are chiefly confined between lat. 30° and 10° N., these limits varying somewhat with the sun's declination. In longitude they are encountered about 200 leagues off the coast of America, and as far as the Ladrone islands. A belt of calms and variable winds is encountered a few degrees N. of the equator. Along the coast of America, and among the islands of Polynesia, including Melanesia and Micronesia, there are areas of periodical winds, in some parts as regular as the monsoons of the Indian ocean. On the coast of Chili northerly winds prevail from May to September, and southerly from October to May. On the coast of California it blows from N. W. during the summer months, and from S. E. to S. W. in winter. Among the islands of Polynesia situated in the region of the S. E. trades, this wind blows regularly between March and October, while westerly winds prevail the rest of the year, with occasionally violent storms. Between the Ladrone and Philippine islands the monsoon is more regular, N. E. from May to April, and S. W. during the other months. As in the Indian ocean, the change of the monsoons is accompanied by storms; but hurricanes of the type of those of the West Indies or Mauritius are not known in the greater part of the Pacific, the exception being the region W. of the La-

drone archipelago, into which the typhoons of the China seas sometimes extend. They occur most frequently in May and June, October and November.—The tides of the Pacific exhibit in a much larger degree than those of the Atlantic the diurnal inequality (see *TIDES*) by which one of the tides of the day is rendered much higher than the other. In some places this is so marked that to ordinary observation there appears to be but one tide in 24 hours. At Tahiti the solar tide exceeds the lunar, a phenomenon which has thus far not been observed in other parts of the world, though it probably prevails throughout that part of Polynesia.—The Pacific ocean is noted for the great number of its islands. We have already mentioned the continental islands forming its western limits. The others, called oceanic islands, are grouped according to certain principal directions, like the summits of submerged chains of mountains. As in these, the direction is not perfectly constant, and the chains are formed by several parallel courses. According to Dana, there are two principal trends in these islands, a northwesterly and a northeasterly one, crossing each other at right angles. The former is the prevailing one. To it belong the Hawaiian chain, in the prolongation of which, though without connection, are found the Galápagos. The great Polynesian chain is formed of a number of links, parallel or overlapping, beginning in the west with the Pelews, and continuing through the Caroline, Ralick, Radack, Kingsmill, Samoa, Society, and Paumotu islands; in the continuation are found Easter island, and at a long distance Mas á Fuera and Juan Fernandez. The Marquesas and Fanning islands form a parallel chain. The Australasian or Melanesian system is connected with the continent of Asia through Java and Sumatra; it comprises Papua, the Admiralty, Louisiade, Solomon, New Hebrides, and Loyalty groups, New Caledonia, and the northern part of New Zealand. To the northeasterly system of trend belong the main part of New Zealand with the Auckland and Macquarie islands, and as a parallel chain Chatham, Bounty, Campbell, and Emerald islands. The Feejee islands lie near the intersection of several chains, and are difficult to associate with either. The Ladrone and Bonin islands belong also to the northeasterly system. All the oceanic islands of the Pacific are either volcanic or formed of coral; in fact they may all be referred to the former origin, those formed only of coral marking the place of a volcanic peak in an area of subsidence. Dana has given, in his "*Corals and Coral Islands*," what are supposed to be the areas of subsidence and elevation in the Pacific.—The inhabitants of the Pacific islands belong to two distinct races, the Malaysian and the Polynesian. (See *MALAYO-POLYNESIAN RACES*.) Their distribution is one of the most interesting chapters of ethnology, connected as it must be with the prevailing course of winds and cur-

rents. They have carried with them almost everywhere the dog, the pig, and the domestic fowl. In many of the groups of islands the natives have at the present day generally embraced Christianity, but at the same time have received the curses apparently inseparable from the introduction of civilization among savage nations, under the influence of which the population is diminishing with fearful rapidity. The white race is rapidly encroaching, and displacing the natives, particularly since the more progressive Anglo-Saxon branch has occupied the shores of this ocean, and established new centres of civilization in Australia, California, and New Zealand. Lines of coasting steamers are established along the whole coast of America, from Alaska to the straits of Magellan, and the coasts of Australia and New Zealand; and transatlantic lines have brought into close connection California, the Hawaiian islands, Japan, China, and Australia.—The marine mammalia of the Pacific have played an important part in the commercial history of the world, but they are being rapidly destroyed. The fur of the sea otter, formerly very common on the northern shores of America and Asia, was at the beginning of this century a most valuable article of trade. Ships used to be fitted out, particularly in Boston, for the purpose of buying these furs from the natives, carrying them to China, where the highest price could be procured, and investing the profits in silks and teas for the return voyage. This trade has entirely ceased. Eared seals, to which division of the family the sea lions and fur seals belong, are found on the coast of South America as far north as the Galápagos islands, the cold current of the coast of Peru proving thus congenial to them as far as the equator. The huge sea elephant, which formerly abounded on the S. coast of Chili and at Juan Fernandez, has been so much hunted for its oil that it has almost entirely disappeared from these parts; but it is still found in the islands bordering on the Antarctic circle. The northern fur seal is now protected by law. The dugong is found on the N. coast of Australia; an allied animal, Steller's sea cow, formerly inhabited the westernmost Aleutian islands, but is now entirely extinct. The whale fishery is still extensively pursued in the Pacific, though the profits are diminishing every year. The right whale of the north is not found on the American coast further south than Vancouver island, but on the Asiatic side it reaches the south of Japan; the sea of Okhotsk is a favorite resort of the whalers in pursuit of it. Another species is found S. of the tropic of Capricorn. In the warmer parts of the ocean it is replaced by humpback and other whales of the finner family, which are taken in considerable numbers on the coast of California. Sperm whales formerly abounded in the tropical regions, certain parts being more frequented than others. They are said by Maury to cross into the Atlantic around

Cape Horn. They are not found near the American shore north of Panama, nor in the Asiatic seas bordering on the Pacific. Fish are abundant everywhere, and constitute an important item in the food of the populations, but do not yet form an article of commerce comparable to the cod and herring of the Atlantic. Mollusks and crustacea present a great variety, the shells being particularly noted for their beauty. Among the echinoderms the *holothurians* or sea slugs deserve mention as forming an article of trade for the China market under the name of tripang or biche de mer. The corals have been mentioned as forming a large part of the Polynesian islands; others they surround by fringing and barrier reefs. Their geographical distribution is dependent on the temperature of the currents. Thus on the American coast no corals are found S. of the equator, on account of the cold Peruvian current, nor on the North American coast S. of the extremity of the Californian peninsula. But in the western part of the ocean coral reefs are found in abundance in a range of latitude extending from 24° S., the extremity of the great Australian reef, and 25° S. among the Paumotu islands, to 28° 30' N. among the small islands N. W. of the Hawaiian group.—The North Pacific has its Sargasso sea, bearing the same relation to the Japanese and North Pacific currents which the Atlantic Sargasso sea bears to the Gulf stream. (See ATLANTIC OCEAN.) It is situated N. of the Hawaiian islands, but is little known in its details. Our knowledge is still more scanty with regard to an accumulation of seaweed to the eastward of New Zealand.

PACINI, Giovanni, an Italian composer, born in Catania, Feb. 11, 1796, died near Pescia, Dec. 6, 1867. He was sent to Rome to be educated as a chapelmaster, whence he is known in Italy as Pacini di Roma. He afterward studied under Mattei in Bologna. After composing several masses, at the age of 18 he produced a comic opera entitled *Annetta e Lucinda*, which proved successful. From that period till 1830 he was a prolific composer of pieces for the stage, which in style resemble the productions of Rossini. In 1830 his opera *Giovanna d'Arco* failed in Milan, and the composer ceased thenceforth to write for the stage. In 1836 he became director of the conservatory at Viareggio. Among his best known operas are *Saffo*, *L'ultimo giorno di Pompei*, and *Medea*.

PACKARD, Alpheus Spring, jr., an American naturalist, born in Brunswick, Me., Feb. 19, 1839. He graduated at Bowdoin college in 1861, passed three years in the museum of comparative zoölogy at Cambridge, Mass., part of the time in charge of the department of entomology, and in 1864 received the degree of M. D. from the Maine medical college. He has made several scientific expeditions; is lecturer on entomology at Bowdoin college; is a curator of the Peabody academy of sciences at Salem, Mass., and one of the editors of the "American

Naturalist" published by the academy; and editor of the "Annual Record of Entomology," begun in 1868. He has published "Observations on the Glacial Phenomena of Labrador and Maine, with a View of the Recent Invertebrate Fauna of Labrador" (4to, Boston, 1867); "A Guide to the Study of Insects" (1869); "Our Common Insects" (1873); and "Half Hours with Insects" (1875).

PACTOLUS (now *Sarabat*), a small river of Lydia, which had its source on the N. side of Mt. Imolus, and, after a northerly course past Sardis, united with the Hermus. It was long famous for its gold washings, but at the beginning of the Christian era the "golden sands" were not worth collecting. (See MIDAS.)

PACUVIUS, Marcus, a Roman dramatic poet, born in Brundisium about 219 B. C., died there about 130. He passed most of his life in Rome, where he devoted himself with considerable success to painting, and executed some works in the temple of Hercules in the forum Boarium. The ancient writers agree in styling him one of the greatest of the Latin tragic poets; and though most of his subjects were borrowed from the Greek dramatists, his plays were not mere translations. He composed several tragedies founded on Roman history, besides a play called *Dulorestes*. Only fragments of his writings are now extant. They were collected by Henry Stephens (Paris, 1564), and have been printed by Bothe in his "Fragments of the Latin Scenic Poets" (Leipsic, 1834), and in several editions of the *Corpus Poetarum Latinorum*.

PADANG. See SUMATRA.

PADERBORN, a town of Prussia, in Westphalia, on the river Pader and on the railway from Berlin to the Rhine, 40 m. S. by W. of Minden; pop. in 1871, 13,727. It contains a cathedral of the 11th century, a seminary with faculties of theology and philosophy, a Catholic gymnasium, a normal school, four convents, and several asylums. It has manufactures of brandy and several other articles, and a considerable trade in agricultural produce. Paderborn was founded by Charlemagne, who assembled here several diets of Saxony, and made the town a bishopric, which was subsequently erected into a principality of the empire. In the middle ages it belonged to the Hanseatic league. Ceded to Prussia in 1803, it was incorporated with the kingdom of Westphalia in 1807, and restored to Prussia by the treaty of Vienna.

PADILLA, Juan Lopez de, a Spanish patriot, born about 1490, executed at Villalar, April 24, 1521. He was one of the foremost to complain of the grievances to which the Castilians were subjected under the Flemish officials appointed by Charles V.; and when the cortes in 1520 voted the monarch a "free gift" without obtaining the redress of any of their wrongs, he incited the people of Toledo to insurrection, was appointed their leader, and organized a popular form of government. Similar risings took place at Segovia, Toro, Salamanca, Mur-

cia, and Ávila; and at a meeting in the last named city a solemn league was formed, and its interests were committed to a *junta de las comunidades* composed of deputies from all the towns. In a short time the rebellion spread all over the kingdom. Padilla, who had driven a body of royalist troops from before the gates of Segovia, marched to Tordesillas, where the queen mother Joanna resided, and placed her at the head of the government. The junta now removed to Tordesillas, seized the members of the council at Valladolid, took possession of the public archives, seals, and treasury books, deposed the regent (Cardinal Adrian of Utrecht, afterward Pope Adrian VI.), and sent a remonstrance to Charles, which proposed a thorough reform of the political constitution of the state. These measures alienated the nobility, who succeeded in depriving Padilla of the military command and conferring it upon Don Pedro de Giron, whose incapacity led to the capture of Tordesillas by the royalists, the seizure of the queen's person, and the recovery of the public seal. Padilla, again taking the command, made himself master of several small towns, and carried Torrelobaton by storm after a desperate siege. The junta, however, consented to a truce, during which the undisciplined popular army rapidly dwindled away, while the royalists under the conde de Haro prepared for battle, and as soon as the truce expired advanced upon Torrelobaton. Padilla was overtaken at Villalar, April 23, 1521, defeated, and made prisoner, and on the next day was executed with his two principal officers without any form of trial.—His wife, MARIA PACHECO, belonged to one of the most illustrious families of Spain, and was an ardent supporter of her husband. When he was in great strait for money after the defeat of Giron, she seized the ornaments in the cathedral of Toledo. After her husband's death she placed herself at the head of the popular party, and invited the French, who had just invaded Navarre, to advance into Castile. The French were defeated, the insurrection was subdued, and after the fall of Toledo she escaped into Portugal, where she passed the rest of her life.

PADUA (It. *Padova*). I. A province of Italy, in Venetia, bordering on Vicenza, Treviso,

Venice, Rovigo, and Verona; area, 755 sq. m.; pop. in 1872, 364,430. The surface generally is level, but in the southwest are the volcanic Euganean hills, near which are numerous mineral springs. The principal rivers are the Adige, which forms the S. boundary, the Brenta, the Musone, and the Bacchiglione. The soil is fertile, and wheat, maize, rice, hemp, flax, grass, and the grape are carefully cultivated. Cattle, sheep, and poultry are reared; oil, silk, and wool of a superior quality are produced. The province is traversed by a number of irrigating and navigable canals. It is divided into the districts of Padua, Camposanpiero, Piove, Cittadella, Monselice, Este, Montagnana, and Conselve. II. A city (anc. *Patavium*), capital of the province, on the Bacchiglione, 20 m. W. of Venice, with which it is connected by railway; pop. in 1872, 66,-



Town Hall, Padua.

107. It is traversed by several canals, which give it communication with the lagoons and with other places. It is sometimes called *Padova la Forte*, and in ancient times it deserved that appellation, but its defences are now dilapidated. The old wall is triangular, about 6 m. in circuit. The city is irregularly built. The narrow streets are lined by arcades, with here and there irregular open spaces, and in the outskirts broad squares. The houses are for the most part well built, and many of the public edifices are fine specimens of architecture. The municipal palace, built between 1172 and 1219, stands entirely upon open arches surrounded by a loggia, and is covered by a vast roof unsupported by pillars and rising about half as high again as the walls. The great hall is about 240 ft. long, 80 ft. wide, and 70 ft. high. It is closely covered with curious allegorical

paintings in 319 compartments, said to have been designed by Giotto, but entirely repainted after having been several times damaged by fire and water. The cathedral is said to have been designed by Michel Angelo, but it was not completed till 1754. It has some good paintings. The baptistery, a Lombard building of the 12th century, contains many interesting frescoes. The bishop's and governor's palaces are also worthy of notice, the latter having a remarkable clock tower. The church of Sant' Antonio, the adjoining school, and the church of Santa Giustina are rich in works of art. In front of the latter is the Prato della Valle, an oval surrounded by a small canal and decorated with about 80 statues, two of which are by Canova. In the midst of the Arena, the ruins of a Roman amphitheatre afterward converted into a fortress, is a chapel built by Giotto and adorned with some of his best paintings. The university of Padua, founded early in the 13th century, was a famous school of law and medicine, and is still the most celebrated seat of the latter science in Italy. It has also faculties of theology, law, and humanities, and in 1873 had 65 professors and 1,121 students. The present edifice was begun in 1493, and the interior court, by Palladio, has great beauty. The botanic garden of Padua, established in 1543, is the oldest in Europe. The city has a celebrated society of arts and sciences, museums, an observatory, and extensive libraries, that of the university numbering 100,000 volumes. It manufactures silks, ribbons, leather, and woolen cloth, and trades in wine, oil, cattle, and garden vegetables.—Padua is one of the most ancient cities of Italy, and according to tradition was founded by Antenor after the fall of Troy. In 1274 a skeleton enclosed in a marble sarcophagus and grasping a sword was dug up in Padua, and at once pronounced to be that of the Trojan founder. The sword was given to Alberto della Scala in 1334, and the sarcophagus now rests under a *baldacchino* in one of the streets. The ancient Patavium was one of the most important cities of Venetia. Even after it fell under the power of the Romans it continued for some time to be one of the first cities of upper Italy. Livy was a native of it. Although sacked by Attila in 452 and by the Lombards in 601, it became in the 10th century once more an important place. In 1239 it became subject to Ezzelino, but after his defeat in 1259 was long independent. In the early part of the 14th century it passed into the hands of the house of Carrara, and in 1405 became subject to Venice, with which it was transferred to Austria by the treaty of Campo Formio in 1797. In 1866 it became, with the rest of Venetia, part of the kingdom of Italy.

PADUCAH, a city and the capital of McCracken co., Kentucky, on the Ohio river, just below the mouth of the Tennessee, 47 m. above the Mississippi and 322 m. below Louisville, and on the Louisville, Paducah, and Southwestern, and the Paducah and Memphis railroads, 215

m. W. S. W. of Frankfort; pop. in 1850, 2,428; in 1860, 4,590; in 1870, 6,866, of whom 2,001 were colored; in 1875, about 12,000. Paducah is the shipping point of the surrounding country, the chief productions of which are tobacco, pork, and grain. It contains four tobacco warehouses, two tobacco stemmeries, a pork-packing house, two large flouring mills, two saw mills, two planing mills, a rolling mill, four shoe factories, two iron foundries, two tobacco factories, &c. There are four banks, a large county court house, a city court house, a female seminary, several public and private schools, two daily and four weekly newspapers, and 15 churches, viz.: Baptist (2), Christian (2), Episcopal, Jewish, Lutheran, Methodist (3), Presbyterian (2), Reformed, Roman Catholic, and Universalist.—Paducah was laid out in 1827, incorporated as a town in 1830, and as a city in 1856.

PADUS. See Po.

PÆONIA. See MACEDONIA.

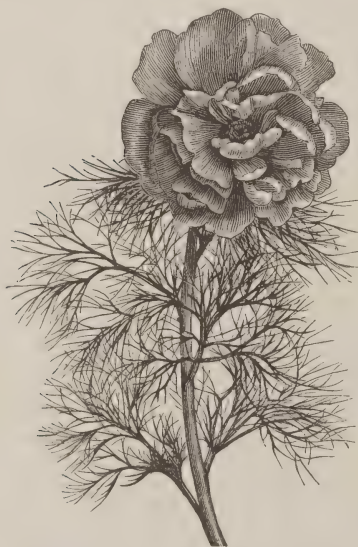
PÆONY, or **Peony** (also written *piony*, and sometimes in popular language reduced to *piny*), the common name for plants of the genus *Pæonia*, which is said to have been so called in honor of Pæon or Pæan, the Homeric physician of the gods of Olympus. The genus belongs to the *ranunculaceæ*, or crowfoot family; it consists of large herbs with tuberous roots, or of shrubs with roots somewhat fleshy, but not distinctly tuberous. The large leaves are compound or decompound, and in the herbaceous species nearly all radical. The very large regular flowers have five persistent sepals, and five to ten broad, conspicuous petals; stamens very numerous, inserted on a fleshy disk (a distinguishing character in the genus), which surrounds the base of the two to five pistils; these at maturity form as many leathery pods, often recurved when ripe, and containing several large seeds. A great many species are enumerated in the books, but they are all probably reducible to four or five; they are natives of southern Europe and the temperate parts of Asia, and one species is found on our northwest coast. Pæonies were introduced into English gardens more than three centuries ago, and so great is the tendency of the species to vary that the named sorts form a very long list. Of the herbaceous species, some produce only a single flower to each stem, and have downy pods. One of this group is the common pæony (*P. officinalis*), the best known of all, a native of southern Europe; it is very smooth, with coarsely divided green leaves; the flowers are red in the wild state, when they are of course single, a condition in which they are sometimes seen in gardens, though the double-flowered is more common; this has produced varieties of various shades of red and crimson, pink, and even white. Among the named varieties of this species are the *anemoniflora*, a double red, *Sabini*, deep crimson, and *aureo-limbata*, in which the centre is filled with small crimson petals surrounded by a row of large outer

petals having yellow edges. The purple pæony is *P. peregrina* (also called *P. paradoxa*), from the Levant; its leaves are three-parted, with the divisions cut into many lobes, glaucous



Common Pæony (*Paeonia officinalis*)

above, and pale and more or less downy beneath; the flowers are smaller than in the common species, and purplish red, with the petals cut on the margins; it has produced varieties of other colors, and some, especially *fimbriata*, in which the petals are conspicuously fringed. The slender-leaved pæony (*P. tenuifolia*), also



Slender-leaved Pæony (*Paeonia tenuifolia*).

called the fennel-leaved, is, as its name indicates, very different from the others in foliage, the leaves being much divided into slender, almost thread-like lobes. This is a native of Si-

beria, and a very beautiful species; it seldom grows over 18 in. high, and with its dark crimson flowers, much smaller than in the other species, contrasted with the delicately cut foliage, it appears very unlike a pæony; there is a variety with double flowers. The Chinese pæony (*P. albiflora*), also called white-flowered, fragrant, and edible pæony, is a native of Siberia, and has long been in cultivation; it differs from all of the preceding in having several flowers upon each stem, and smooth pods; it grows about 3 ft. high, and has bright green foliage and flowers, rather smaller than those of the common species. The wild flowers are white, but its varieties present a great diversity in color from white and rose color to purple, and some have yellowish and salmon-colored petals; some are sweet-scented, and many are double. This species has produced many more varieties than either of the others, some of which, having originated in China, have been regarded as species; some of the sorts are of great beauty, showing a blending of various shades or a contrast of different colors in the



Tree Pæony (*Paeonia moutan*).

same flower. Of the older varieties, one of the most remarkable is *Humei*, with very large purplish rose-colored flowers, so thoroughly double that they produce no seed; *Pottsii* has the darkest crimson flowers; and *Whitleyi* and *festiva* are white-flowered and fragrant.—The tree pæony (*P. moutan*) is shrubby; on this account, and as the disk at the base of the ovaries, which in the herbaceous species is a mere ring, in this is developed to form a thin fleshy sac, covering the five or more ovaries, it has been placed in a distinct genus, *moutan*; but the best authorities retain it as a *pæonia*. The specific name, *moutan*, is said to be from the Chinese *meu-tang*, meaning the king of flowers. In our gardens it is seldom more than 3 ft. high, but it is said to reach 10 ft. in China, where as well as in Japan it is a favorite plant. It forms by branching near the base a hemispherical bush, which when covered with a profusion of large flowers presents a splendid appearance. The ample leaves are of a pale glaucous color; the flowers, which are 6 in. or more across, are single or double, and present

the same varieties in color as the herbaceous kinds, and some of them are fragrant. There are 50 or more varieties in the catalogues, but many of these are not very distinct; among the most striking are the poppy-flowered (var. *papaveracea*), with large single flowers, sometimes 10 in. across, with white petals having a deep purple spot at the base of each; some of the poppy-flowered kinds are blush or rose-colored, with purple centres.—It is within a comparatively few years that pæonies have been regarded as florists' flowers; the introduction of new and fine varieties has caused their merits to be appreciated, and they are now much used for decorative planting. From their size they are not suitable for small gardens or borders, but if set where they can be seen from a little distance, against a background of evergreen or other dark foliage, they are very effective, and their foliage is pleasing when the plants are not in bloom. The herbaceous species and their varieties are perfectly hardy; the slender or fennel-leaved blooms early in May; the varieties of the common pæony flower from the middle to the end of May, and are succeeded by the Chinese sorts, which continue through June and July. New varieties are obtained from seed, which should be sown as soon as ripe, and even then it often remains dormant for a year. The established sorts are multiplied by division; this should be done in early autumn, which is also the proper time for transplanting, as the plants are then perfectly dormant; if disturbed in spring, they seldom flower that year. The plant, being carefully taken up, is divided into as many pieces as there are buds, if a tuber can be secured with each. To

obtain the best results, they should have a rich soil and be left undisturbed for several years. The varieties of the tree pæony bloom in May and later; in very cold localities they need a slight protection; they are propagated from suckers thrown up by old plants, by layering, by cuttings, and by grafting, either upon roots of the same kind or those of the herbaceous species.—Our native species is *Pæonia Brownii* (*P. Californica* is the same), which is found from the mountains of Washington territory to those of California; it is a low herbaceous plant, with comparatively small reddish-purple flowers, which do not fully expand.

PAER, **Ferdinando**, an Italian composer, born in Parma in 1771, died in Paris, May 3, 1839. He is said to have composed an opera at the age of 10. He produced several operas at Vienna, acted as chapelmaster at Dresden, was appointed imperial composer by Napoleon in 1806, and between 1818 and 1825 was director of the Italian opera in Paris. He was a prolific composer of operas, cantatas, overtures, &c., and his dramatic pieces abound in striking melodies and effective accompaniments. His chief operas are *Camilla*, *Sargino*, *Achille*, *Leonora*, *Dido*, *Griselda*, and *Agnese*.

PÆSTUM (originally *Posidonia*, city of Poseidon or Neptune), an ancient city of southern Italy, situated in the N. W. extremity of Lucania, about 4 m. S. E. of the mouth of the Silarus (Selo), and on a bay of the Tyrrhenian sea, called *sinus Pæstanus* (now the gulf of Salerno). Its site, now called Pesto, is covered with magnificent ruins, on an uninhabited plain by the seashore. The principal remains are those of two temples, which, with the ex-



Ruined Temples at Pæstum.

ception of the temple of Corinth, are the most massive examples of Doric architecture now extant. The finer and older of the two, known as the temple of Neptune, is open to the sky, and is 180 ft. long and 80 ft. wide. The other, variously called the temple of Vesta and of

Ceres, is 107 ft. long by 48 wide. The walls are built of large polyhedric masses of travertine, and form an irregular pentagon 3 m. in circuit; they are in many places still 12 ft. high. Remains of eight towers and four gateways are traceable, and the eastern gateway

with an arch 50 ft. high is almost perfect. Around and amid the whole grow profusely the famous Pæstan roses, which even in their wild state flower twice a year, and are remarkable for their fragrance.—A colony of Greeks from Sybaris settled here in 524 B. C., and the city flourished and grew powerful. Being taken by the Lucanians about 430, it gradually lost the character of a Greek city, and its inhabitants finally ceased to speak the Greek language. During the war with Pyrrhus the Romans founded there a Latin colony. About the 11th century, after the devastation of the Saracens, it fell into complete decay. Its ruin, generally attributed to foreign enemies, is by Strabo assigned to its unhealthy atmosphere. Sulphurous springs in the neighborhood still form stagnant pools, and a stream running under the walls overflows the low grounds and forms a marsh around the city.

PAEZ, Francisco, a Spanish Jesuit missionary, born at Olmedo, near Valladolid, in 1564, died in Abyssinia about 1620. In 1588 he was sent from Goa with Father Antonio Montserrat to direct a mission in Abyssinia. On the voyage thither they were made prisoners by an Arab pirate and carried to Sana, the capital of Yemen, where they passed seven years. Ransomed at length by the viceroy of India, the two missionaries returned to Goa in 1596. Pæz, after passing a few years at Diu and Cambay, again took ship for Abyssinia, and in 1603 reached Massowa, where he learned the native language, translated into it a compendium of the Christian doctrine, and instructed the children. The king, Za-Denghel, ordered him to appear at court with two of his pupils, and was so much impressed that he wrote to the pope and to Philip III. of Spain for more missionaries. The Abyssinian priests stirred up an insurrection in which Za-Denghel lost his life (1604); but the next king, Susneius or Melek Seghed, was still more favorable to the Spaniard, and granted him a piece of ground for a convent. Father Pæz accompanied the king on his military expeditions, and on one of these occasions discovered the sources of the Abai, the eastern upper branch of the Blue Nile, which he was the first European to visit. Nicolas Antonio attributes to Pæz a general history of Ethiopia (not published), a treatise *De Abyssinorum Erroribus*, and several letters printed in the *Literæ Annua*.

PAEZ, José Antonio, a Venezuelan soldier, born near Acarigua, province of Barinas, June 13, 1790, died in New York, May 6, 1873. At the age of 18 he became overseer of a cattle estate. In 1810 he joined the patriots, collected a band of daring *llaneros*, and soon became the terror of the Spanish commanders. In 1815 he defeated the royal troops under Lopez at Mata de la Miel, and in 1816 at Montecal. Soon afterward he was made commander of the revolutionary forces, with the rank of brigadier general, and again defeated Lopez, taking the city of Achaguas, recovering the province

of Apure and a part of Barinas in Venezuela, and Casanare in New Granada. In 1817 he defeated the royal army under La Torre, and soon afterward he acknowledged the authority of Bolivar, with whom thenceforth he acted in concert. In 1819 he became general of division, and was successful in several encounters with the Spanish general Morillo. The victory of Pæz at Carabobo in 1821 secured the independence of Colombia, and his capture of Puerto Cabello in 1823 removed the last trace of Spanish authority there. On the formation of the new government he represented Venezuela in the senate, acting with the federative party. In 1826, in the execution of an order requiring the enlistment of all citizens between the ages of 16 and 50, Pæz gave so much offence that the house of representatives resolved to impeach him. Refusing to obey the summons, he put himself at the head of the military and of the party opposed to the constitution, and a revolt followed, which continued till Bolivar returned and recognized Pæz as the commander in Venezuela. In 1829 Venezuela was declared independent, and in 1830 Pæz was elected president. Subsequently he suppressed two insurrections under Monagas, was presented by congress with a golden sword, and was honored with the title of "illustrious citizen." In 1839 he was again elected president, and in 1846 was succeeded by Monagas. In 1848, when Monagas endeavored to usurp the supreme authority, Pæz took command of the revolutionary army, but was captured and imprisoned. Released finally by congress, but exiled, he went in May, 1850, to New York, where he remained till December, 1858, when, the Monagas party having been overthrown, he returned by special invitation to Venezuela. In 1860 he was accredited as minister to the United States, but resigned in 1861. On his return he was invested with supreme authority to quell disturbances in Venezuela; but failing in his efforts, he again went to New York in 1864. He afterward lived for some time in the Argentine Republic and in Peru, receiving large pensions in both countries.—See *Autobiografie del General José Antonio Pæz* (vol. i., 8vo, New York, 1867), and "Public Life of J. A. Pæz," by his son Ramon Pæz (New York, 1854). The latter has also published "Wild Scenes in South America" (12mo, 1862), enlarged as "Travels and Adventures in South and Central America" (1868), and *Ambas Américas: Contrastes* (1872).

PAGANINI, Nicolò, an Italian musician, born in Genoa, Feb. 18, 1784, died in Nice, May 27, 1840. He was subjected by his father to a very severe training. At six years of age he was a violinist, and began to practise novel effects upon his instrument, and to perform feats requiring great power and quickness of execution; at eight he had composed a sonata, which has been lost; and at nine he made his first public appearance in the largest theatre in Genoa, rousing the audience to an extraordi-

nary pitch of excitement by the performance of variations, composed by himself, on the French air *La Carmagnole*. In 1797, in company with his father, he made his first musical tour in Italy, and soon after produced music which defied the attempts of other violinists, and greatly taxed his own powers. The severe discipline to which his father subjected him meanwhile became so irksome, that before attaining his 15th year he ran away, and began a course of concerts at Lucca, Pisa, and other cities. The flatteries lavished upon him, together with the possession of large sums of money, induced habits of dissipation. For several years he led a vagabond life, and about the age of 18, it is said, formed a connection with an Italian lady of rank, with whom he retired to an estate of hers in Tuscany. Here he renounced the violin and devoted himself to the guitar; but his old tastes returning, he went in 1804 to Genoa and studied composition with renewed vigor. In 1805 he began another musical tour of Italy, and between 1806 and 1808 was director of the orchestra in the service of the princess Elisa of Lucca, sister of Napoleon. At this period he first performed his remarkable feat of playing the military sonata entitled "Napoleon" on a single string. The next 20 years he spent in the chief cities of Italy, where his fame exceeded that of any previous or contemporary violinist. In 1828 he made his first appearance in Vienna, and was received with an enthusiasm bordering on the wildest extravagance. Poems were composed in his praise, medals struck in his honor, articles of dress were named after him, and the emperor appointed him violinist of his private band. After a triumphant career in Germany he arrived in Paris in March, 1831, and during the next two months produced a sensation almost without a parallel in that city. In England, whither he went in May of the same year, his reception was not less enthusiastic, notwithstanding he charged the most exorbitant prices for admission to his concerts. Soon afterward he retired to a country seat near Parma, but the latter years of his life were rendered unhappy by lawsuits and ill health. He left a fortune of several million francs, the greater part of which was bequeathed to his natural son Achillino, whose mother was a Jewess of Milan. His personal appearance, studiously eccentric, his facility in making his instrument produce effects at once startling and unearthly, and a certain mystery connected with his character and early career gave rise to numerous stories which greatly enhanced his notoriety. He was of a gross and sensual disposition, in general exceedingly avaricious, and vain to excess of popular applause. As an artist his name has become a synonyme for all that is excellent in violin playing, notwithstanding that he degraded his art by feats little better than sleight of hand. His compositions are full of invention and beauty. His life has been written by Schottky under

the title of *Paganini's Leben und Treiben* (Prague, 1830).

PAGANISM, a general term applied to all forms of religious worship except Christianity, Judaism, and Mohammedanism. When Constantine forbade the worship of the heathen deities, the followers of the old religion retired to the country villages (*pagi*), where they could practise their rites in secrecy, and were hence called by the Christians *pagani*, or country people. The term thus came in time to denote heathens generally, irrespective of their places of abode. In the middle ages it was also applied to Mohammedans.

PAGE. I. A N. E. county of Virginia, bordered E. by the Blue Ridge, and intersected by the Shenandoah river; area, about 250 sq. m.; pop. in 1870, 8,462, of whom 986 were colored. The soil is very fertile. The chief productions in 1870 were 128,543 bushels of wheat, 18,583 of rye, 93,765 of Indian corn, 24,249 of oats, 43,932 lbs. of butter, and 3,315 tons of hay. There were 1,965 horses, 1,450 milch cows, 3,084 other cattle, 2,532 sheep, and 5,254 swine; 1 bloomery, 2 blast furnaces, and 13 distilleries. Capital, Luray. **II.** A S. W. county of Iowa, bordering on Missouri, drained by the Nodaway and several branches of the Nishnabotona and Pakio rivers; area, 576 sq. m.; pop. in 1870, 9,975. It has a rolling surface and fertile soil. The Brownsville and Nodaway railroad ends at the county seat, and a branch of the Burlington and Missouri River railroad to Nebraska City crosses the N. W. corner. The chief productions in 1870 were 69,436 bushels of wheat, 1,001,054 of Indian corn, 123,457 of oats, 68,856 of potatoes, 188,699 lbs. of butter, 22,213 of wool, and 16,352 tons of hay. There were 4,645 horses, 3,899 milch cows, 5,589 other cattle, 7,532 sheep, and 14,619 swine. Capital, Clarinda.

PAGE, William, an American painter, born in Albany, N. Y., Jan. 23, 1811. He went to the city of New York with his parents in 1819, and at the age of 11 received a premium from the American institute for a drawing in India ink. At the age of 14 he was put into the law office of Frederick De Peyster; but his passion for art was so strong that he soon left it and engaged himself as an apprentice to Herring, a portrait painter, with whom he remained nearly a year. He afterward became a pupil of S. F. B. Morse, was admitted as a student at the national academy, and received a large silver medal for his drawings from the antique. At the age of 17 he became a member of a Presbyterian church, and went to Andover, Mass., and afterward to Amherst, to study theology; but at the end of two years his religious ardor cooled, and he returned to his artistic pursuits. After spending a year in Albany painting portraits, and exciting great expectations by the brilliancy of his color and the accuracy of his drawing, he went to New York, and was admitted a member of the national academy. He painted the

portrait of Gov. Marcy for the New York city hall, and that of John Quincy Adams for Faneuil hall in Boston. Besides portraits, he executed several historical compositions, among which were a "Holy Family," now in the Boston Athenæum, "The Wife's Last Visit to her Condemned Husband," and "The Infancy of Henri IV." About 1844 he went to Boston to reside, and painted there a large number of portraits. In 1847 he returned to New York, where he remained two years, and then went to Europe, residing 11 years in Florence and Rome, and returning to New York in the autumn of 1860. For four or five years subsequently he resided at Eagleswood, near Perth Amboy, N. J., and then built a house at the southern end of Staten island for his family, while he passes most of his time at his studio in New York. During his residence in Italy he painted the portraits of many distinguished Englishmen and Americans, and produced his two Venuses, his "Moses and Aaron on Mount Horeb," the "Flight into Egypt," the "Infant Bacchus," and other works. His copies of Titian, whose method of painting he professes to have discovered, were so remarkably like the originals, that one of them was stopped by the authorities at Florence under the belief that it was the original painting. Since his return to America he has delivered several courses of lectures on art, and has published a "New Method of Measuring the Human Body," based upon the models of the antique. In May, 1871, he was elected president of the academy of design, which office he held for two years. For several years he has been occupied with producing a bust of Shakespeare from photographs of a supposed mask of the poet taken after his death and now preserved in Germany. In 1874 he made a visit to Germany to study this mask. From the bust he has painted several portraits of Shakespeare. Among other portraits, he has painted those of Henry Ward Beecher, Charles A. Dana, Parke Godwin, Wendell Phillips, and Admiral Farragut. The last, a full-length representing Farragut at the battle of Mobile, was purchased by a committee in 1871 and presented to the emperor of Russia. A portrait of Christ painted and exhibited in 1870 attracted great attention, and excited much controversy.

PAGET, Sir James, an English surgeon, born in Great Yarmouth in 1814. He is the son of a merchant, and was educated at the medical school connected with St. Bartholomew's hospital in London. He began practice there in 1834, and became sergeant surgeon extraordinary to the queen and surgeon to the prince of Wales. He received the degree of D. C. L. from Oxford, of M. D. from Bonn, and of LL. D. from Edinburgh, is a member of the senate of the university of London, and was created a baronet in 1871. Among his works are "Lectures on Surgical Pathology" (1853-'68).

PAGODA, a kind of temple common in China and Indo-China, and especially in Burmah.

Chinese pagodas are generally towers nine stories high. The most celebrated of these was the porcelain tower at Nanking, called the tower of gratitude from having been erected (1413-'32) as a monument of gratitude to an empress of the Ming dynasty, and destroyed during the Taiping rebellion. (See NANKING.) Almost every town in China has one or more of these structures, all alike in design, but differing in dimensions and in the richness of the materials and ornaments. The Burmese pagodas are square edifices of great extent, the base comprising porticoes and central chambers, and terminating upward in octagonal or polygonal straight-lined pyramids or spires. The principal of these temples is called Khomado, and is on the bank of the Irrawaddy nearly opposite Ava. It is 160 ft. high, surmounted by a spire 22 ft. high and 15 ft. in diameter. The circumference of its base is 944 ft., and it is surrounded by a stockade of 802 dwarf pillars of sandstone about 5 ft. high. The next great pagoda of Burmah is the Shoëmadoo at Pegu, which rises to the height of 361 ft. with a diameter at the base of 395 ft. Throughout Burmah these edifices abound.

PAHLEN, Peter Louis, count, a Russian conspirator, born about 1750, died in 1826. He was a cavalry officer, and in 1790 became ambassador at Stockholm, in 1793 governor of Livonia, and in 1796 lieutenant governor of the newly acquired province of Courland. Under Paul I. he was made count, general of cavalry, and military governor of St. Petersburg (1801), and succeeded Rostoptchin as the principal favorite. Being afraid of losing the emperor's good will, he took part in the conspiracy which resulted in Paul's assassination (March 23, 1801), and spent the rest of his life in disgrace.—His son **PETER** (1777-1864) displayed ability in the campaigns against Napoleon and in the warfare against Turkey, and was ambassador at Paris from 1835 to 1841, and general inspector of cavalry from 1847 to 1862. The latter's brother **FREDERICK** (1780-1863) was minister at Washington and Munich, and negotiated together with Orloff in 1829 the treaty of Adrianople.

PAILLERON, Edouard, a French dramatist, born in Paris in 1834. He began life as clerk of a notary, and published in 1860 a volume of satirical poetry and a play. Among his most successful subsequent productions are: *Le dernier quartier*, produced at the Théâtre Français in 1863; *Le second monument*, at the Odéon in 1865; *Le monde, où l'on s'amuse*, at the Gymnase in 1868; and *Les faux ménages*, his best comedy, 1869.

PAINE, Martyn, an American physician, born in Williamstown, Vt., July 8, 1794, died in New York, Nov. 10, 1877. He graduated at Harvard college in 1813, studied medicine, practised in Montreal from 1816 to 1822, and then removed to New York. During the cholera epidemic of 1832 he published a series of letters upon the disease to Dr. J. C. Warren of Bos-

ton, which were collected into a volume entitled "The Cholera Asphyxia of New York" (1832). In 1841 he united with five other physicians in establishing the university medical college (the medical department of the university of New York), in which he held for many years the chair of the institutes of medicine and materia medica, and afterward that of therapeutics and materia medica. In 1854 he was prominent in securing a repeal of the law against dissections of the human body, which was till then a state prison offence. He was a member of many of the principal learned societies in Europe and America. His principal works are: "Medical and Physiological Commentaries" (3 vols. 8vo, 1840-'44); "Materia Medica and Therapeutics," on an original plan (1842); "The Institutes of Medicine" (1847; last ed., 1870); "The Soul and Instinct, physiologically distinguished from Materialism" (1848; enlarged ed., 1872); and "A Review of Theoretical Geology" (1856), directed against the geological interpretations of the Mosaic narratives of the creation and the flood. In 1852 he prepared for private circulation a memoir and the literary remains of his son Robert Troup Paine, who graduated at Harvard college in 1851, and died the same year.

PAINE. I. Robert Treat, an American statesman, born in Boston, March 11, 1731, died there, May 11, 1814. He graduated at Harvard college in 1749, studied theology, and acted in 1755 as chaplain of the provincial troops on the northern frontier. After a visit to Europe he studied law, and in 1759 settled in Taunton, where he resided many years. He was a delegate in 1768 to the convention called by leading men in Boston, after the dissolution of the general court by Gov. Bernard for refusing to rescind the circular letter to the other colonies. In 1770 he conducted, in the absence of the attorney general, the prosecution against Capt. Preston and his men for firing on the inhabitants of the city. In 1773, and again in 1774, he was chosen to the general assembly of Massachusetts; and he was a delegate to the continental congress from 1774 to 1778, and was one of the signers of the Declaration of Independence. During the same period he occupied important stations in the government of Massachusetts. When, in October, 1780, the state constitution was adopted, he was chosen attorney general, and held that office till 1790, when he became a judge of the supreme court. In 1804 he resigned on account of deafness and infirm health. The same year he was a state councillor, but shortly afterward retired from public life. He was one of the founders of the American academy, established in Massachusetts in 1780. **II. Robert Treat, jr.**, an American author, son of the preceding, born in Taunton, Mass., Dec. 9, 1773, died in Boston, Nov. 13, 1811. His name was originally Thomas Paine, but in 1801 it was changed by act of the legislature to that of his father, when he remarked that he now had a "Chris-

tian" name, in allusion to Thomas Paine the infidel. He graduated at Harvard college in 1792, and entered mercantile life; but in October, 1794, he started a semi-weekly newspaper called the "Federal Orrery." In February, 1795, he married Miss Baker, an actress. On taking the degree of A. M. in that year, he delivered a poem on "The Invention of Letters," which brought him \$1,500, being more than \$5 a line. In 1796 he sold his newspaper, which had become unprofitable; and a poem entitled "The Ruling Passion," delivered before the Phi Beta Kappa society in the same year, yielded him \$1,200. In 1798 he wrote the celebrated song of "Adams and Liberty," for which he received \$750, or more than \$11 a line. Resigning the office of "master of ceremonies" at the theatre, which had been created for him, he studied law, was admitted to the bar in 1802, and commenced practice in Boston with great success; but soon resuming his old acquaintance with the players, and his former unsettled mode of life, he passed his last days in misery and destitution. His works were collected and published by Charles Prentiss in 1812 (1 vol. 8vo, Boston).

PAINE, Thomas, an American political writer, born at Thetford, county of Norfolk, England, Jan. 29, 1737, died in New York, June 8, 1809. He learned under his father, a Quaker, the trade of staymaking. About 1755 he shipped in a privateer, and in 1759 settled at Sandwich, where he worked at his trade, and preached occasionally as a dissenting minister. In 1760 he obtained a place in the excise at Thetford, and subsequently at Lewes in Sussex, where he also carried on business as a grocer and tobacconist. He was chosen by the excisemen to speak for them, and wrote in 1772 "The Case of the Officers of the Excise." Being accused of smuggling in connection with his business as a grocer, he was dismissed from the excise. Benjamin Franklin having advised him to go to America, he arrived in Philadelphia in December, 1774, and was employed as editor of the "Pennsylvania Magazine." In October, 1775, he published in the "Pennsylvania Journal" his "Serious Thoughts," in which he declared his hope of the ultimate abolition of slavery, and his belief in the separation of America from Great Britain. His writings attracted the attention of Dr. Benjamin Rush, at whose suggestion, it is said, he wrote "Common Sense," a pamphlet advocating an independent republic. It made a profound impression, and is said to have had a wider circulation than any paper published until that time in America. It was strongly opposed and denounced, but struck the keynote of popular feeling, and contributed much to the dissemination of republican ideas. The legislature gave him £500, and the university of Pennsylvania conferred upon him the honorary degree of M. A. The work was first published anonymously and without copyright, and its great circulation did not reimburse the author.

After independence was declared Paine volunteered in Gen. Roberdeau's division of the flying camp, and afterward was aide-de-camp to Gen. Greene. In December, 1776, he published his first "Crisis," which began with the phrase: "These are the times that try men's souls." This was read by order at the head of every regiment, and did much to rouse the drooping ardor of the people. A second number of the "Crisis" appeared after the battle of Trenton, and other numbers at irregular intervals, until the 18th and last on the attainment of peace, April 19, 1783. In 1777 he was elected secretary to the committee on foreign affairs, but was censured by congress and obliged to resign for making improper use of official secrets in his letters in the "Pennsylvania Packet" against Silas Deane. In November, 1779, he was elected clerk to the general assembly of Pennsylvania. In the following June a letter was received by the assembly of Pennsylvania from Gen. Washington, saying that, notwithstanding his confidence in the attachment of the army to the cause of the country, he feared their distresses would soon cause mutiny in the ranks. This letter was read by Paine as clerk. A despairing silence pervaded the hall, and the assembly soon adjourned. Paine wrote to Blair McClenaghan, a merchant of Philadelphia, explaining the urgency of affairs, and enclosed in the letter \$500, the amount of salary due him as clerk, as his contribution toward a relief fund. McClenaghan called a meeting next day and read Paine's letter; a subscription list was immediately circulated, and in a short time £300,000 Pennsylvania currency was collected. With this as a capital, the Pennsylvania bank (afterward expanded into the bank of North America) was established for the relief of the army. In 1781 Paine was sent with Col. Laurens to France to negotiate a loan, and secured 6,000,000 livres from the French government, and its guarantee for 10,000,000 advanced by Holland. In 1782 he wrote a "Letter to the Abbé Raynal," correcting mistakes in the account by the latter of the American revolution. In January, 1785, he was elected a member of the American philosophical society, and in the following October received \$3,000 from congress as a testimonial for his services during the revolution; and the state of New York granted him a house and farm of 300 acres in New Rochelle, it being the confiscated estate of a royalist. On April 26, 1787, he sailed for France, where he was cordially received by many eminent men. He submitted the model of an iron bridge which he had invented to the academy of sciences at Paris, whose opinion of its merits was decidedly favorable. In September he visited his mother in England, and wrote the "Prospects of the Rubicon." In 1788 he resided at Rotherham in Yorkshire, superintending the erection of his iron bridge, of which Stephenson says: "If we are to consider Paine as its author, his daring in engi-

neering certainly does full justice to the fervor of his political career; for successful as the result has undoubtedly proved, want of experience and consequent ignorance of the risk could alone have induced so bold an experiment; and we are rather led to wonder at than admire a structure which, as regards its proportions, and the quantity of material employed in its construction, will probably remain unrivalled." This bridge was put up for exhibition in an open field at Paddington, and was afterward taken down and the materials used in the one which now spans the river Wear at Sunderland. In 1791 appeared the first part of his "Rights of Man," written as a reply to Burke's "Reflections on the French Revolution;" the second part was issued in 1792. This work had an immense circulation, and was translated into French. The American edition was prefaced with a commendatory note by Thomas Jefferson. In 1792 he gave the revolutionary society of England an order on Jordan, his publisher, for £1,000, to be applied in the furtherance of their objects. In September of the same year a deputation from France announced to Paine his election to the French national convention from the department of Calais. He immediately left England to take his seat, and met with a triumphant reception in Paris. The revolutionary doctrines of the "Rights of Man" caused his indictment in London for sedition. The following December his trial took place, and, not appearing to receive his sentence, he was outlawed. In the national convention Paine generally voted with the Girondists. He was associated with Brissot and Condorcet on the committee that framed the constitution of 1793. As a member of the convention, he advocated the trial of Louis XVI.; but when the sentence of that unfortunate monarch came up for discussion, he opposed his death, and suggested his banishment to America. He incurred the ill will of the extreme party, and was imprisoned by Robespierre as a foreigner. On his way to prison he placed the manuscript of the first part of his "Age of Reason" in the hands of Joel Barlow. His confinement lasted from January to November, 1794. When he was first arrested, the Americans in Paris went in a body to apply for the release of "the apostle of liberty in America," as they styled him; but they were unsuccessful. A few months after the death of Robespierre, James Monroe, the American minister in France, procured his liberation, and tendered him a home in his own family, which Paine enjoyed for about 18 months. In December he resumed his seat in the national convention, on the invitation of its members. In 1795 the second part of the "Age of Reason" appeared. It was denounced as atheistical, but unjustly. It assailed Christianity with great boldness, though not advancing many new arguments, or displaying any great study of the subject. Its position is deistical, declaring a belief in God and a future life. In April, 1796,

he published an essay "On the English System of Finance," and in the following July a "Letter to General Washington," in which he accuses him of ingratitude in not attempting to procure his liberation from his French prison. "Agrarian Justice," and a "Letter to the People and Armies of France," appeared in 1797. In 1802 Paine resolved to return to the United States, and at his request President Jefferson offered him a passage in the sloop of war Maryland, that he might be secure from British capture. He arrived at Baltimore, after an absence from the United States of 15 years, on Oct. 30, 1802. Jefferson invited him to Monticello. At Washington he was cordially received; and while there he wrote his "Letters to the People of the United States." On his way to New York he was grossly insulted by the federalists at Trenton. His admirers in New York and Philadelphia honored him with public dinners; his enemies thought that he and Jefferson "should dangle from the same gallows." He finally settled in New York, occasionally passing a few months on his farm at New Rochelle. Just before his death he requested to be interred in a Quaker burial ground; but the Quakers refusing to permit this, his remains were taken to New Rochelle and buried on his farm. In 1819 William Cobbett, the English reformer, took his bones to England. A monument was erected to his memory in 1839 within a few feet of the spot where he was originally buried. A memorial building was dedicated in Boston, Jan. 29, 1875, having over the entrance the inscription: "Paine Memorial Building and Home of the Boston Investigator."—Among the biographers of Paine are George Chalmers, under the pseudonym of Francis Oldys (London, 1791; 5th ed., 1792), William Cobbett (1796), James Cheatham (New York, 1809), T. C. Rickman (London, 1814), W. T. Sherwin (1819), and Gilbert Vale (New York, 1841). The most complete edition of his works is that by J. P. Mendum (Boston, 1856), which however contains several articles not by Paine. A new edition of his political works, with a report of his trial in 1792, and also of his theological works, was published in London in 1861.

PAINESVILLE, a village and the capital of Lake co., Ohio, on the W. bank of Grand river (crossed near here by a stone viaduct of four arches, 800 ft. long and 83 ft. high), 3 m. from the best natural harbor on Lake Erie, and on the Lake Shore and Michigan Southern and the Painesville and Youngstown railroads, 29 m. N. E. of Cleveland; pop. in 1870, 3,728. It is beautifully situated about 100 ft. above the lake, and contains a handsome public park near its centre and many tasteful buildings. It has an active trade, and contains the works of the Geauga furnace company and several flouring mills, tanneries, founderies, machine shops, &c., two banks, a savings institution, a female seminary, graded public schools, three weekly newspapers, and six churches.

PAINTER'S COLIC. See COLIC, and LEAD.

PAINTING, the art of representing objects by means of light and shade or color upon a smooth surface. Whatever importance such objects possess for the purposes of science, to the painter they present five qualities or elements, as follows: shape (or form), size (or quantity), light and shadow (or gradation), local color (or hue), and texture. No object in nature is without these distinctive characteristics, and no object in nature has other than these for pictorial treatment. Hence a painting is meritorious in the degree that it exhibits these traits with accuracy. Of the various theories respecting the origin of the art, that seems the most natural which makes it coeval with the invention of writing. Goguet in his *Origine des loix* notices the fact that the earliest people made their first essays in writing by representing to the eye the objects they wished to impress upon the mind; and so far as observation has demonstrated, this remark holds good of all primitive races. No date can be assigned to the commencement of this practice, and, as Haydon has remarked, "in what country painting first originated is nearly as difficult to discover, as it is to find a country where it never existed at all." Dismissing for want of authentic materials any inquiry into the progress of the art among the Chinese, the Hindoos, the Persians, the Assyrians, the Phenicians, and their cognate races, by whom it was probably never developed beyond the rudest stages, we may begin the history of painting with Egypt, where it can be traced to a very remote antiquity. The earliest remains are probably not less than 4,000 years old, and exhibit no inconsiderable mastery of form and expression. Egyptian paintings are comprised in three classes, those on the walls of tombs and temples, those on the cases and cloths of mummies, and those on papyrus rolls. The first are the most numerous and meritorious, although none of them can be properly considered works of art, but rather the symbolic writings which record the social, religious, and political life of the people. Sculpture and painting were originally practised in conjunction, the latter being the subordinate art, and the earliest employment of the painter was to color statues, bass reliefs, and intaglios or sunk reliefs. To this succeeded the execution, under a strict code of conventional rules prescribed by the priesthood, of those elaborate works which afford such vivid illustrations of the manners and customs of the ancient Egyptians. According to Pliny, painters and sculptors were forbidden to introduce any change or innovation into the practice of their respective arts, or in any way to add to them; and hence the monotonous character of Egyptian art, the perpetual recurrence through thousands of years of similar types of form, and the absence of any progressive development such as may be witnessed in the productions of the Greeks and other races. It was

doubtless owing to this dependence upon established canons that the artists were enabled to impart to their works that character of stability and unity of purpose which so impresses the modern traveller on the banks of the Nile. Their technical merits are slight. The imitation of nature was never carried beyond an outlined diagram arbitrarily colored; of ideal beauty they are utterly destitute; and perspective, chiaroscuro, and the science of composition seem to have been unknown. Men and women were generally painted red, animals brown, birds blue and yellow, and other objects according to similar arbitrary rules, in utter disregard of their natural appearance. Sometimes a varnish of glue or resin was applied to the finished picture, which may account for the freshness which the colors still retain. The most flourishing period of Egyptian art was that from about 1400 B. C. to the Persian conquest in 525, after which a slow but gradual decline is observable, until in the early part of the Christian era the art of the Greeks becomes predominant.—In common with other arts, painting appears to have been established in Greece mainly through communication with Egypt and Asia, and previous to the commencement of the 5th century B. C. it was chiefly ornamental or representative, its application being limited to the decoration of temples, the coloring or imitation of bass reliefs, and similar purposes. With the struggle against the Persians, the great promoter of intellectual activity among the Hellenic races, it began to assume its peculiar Greek character and to be practised as an independent art; and from that era until after the death of Alexander it received its most perfect development. The whole period preceding the Persian invasion may be said to constitute the mythic age of Greek art, during which a slow but gradual approximation toward excellence was observable, the motive for which must be traced to the character of the people and of their religion. Love of beauty was with the Greeks a religious principle; their deities were models of physical excellence, and their own habits tended to bring the human form to a high degree of perfection. Hence, when painting and sculpture were made to subserve the cause of religion by representing to the eye the material forms of Greek mythology, the artist strove to clothe these with the attributes of majesty, loveliness, or grace; and this effort, continued through successive ages among a people of remarkable acuteness and intelligence, developed art from its original Egyptian rudeness and arbitrary conventionalism into life, motion, and liberty. The Egyptian artist reproduced for ages a fixed archaic type of the human figure, while his Greek successor aimed at an ideal perfection, which made him the supreme master of expression and form. With the arrival of Polygnotus of Thasos in Athens, about 463 B. C., begins the authentic history of Greek art, and the supremacy of Athens as the capital

of the arts, although few of the great painters of Greece were natives of that city. Aristotle calls him *ἡθογράφος*, the painter of character, and he is mentioned by other Greek writers as one of the most distinguished painters of antiquity in the essentials of form, expression, and color. He was employed to decorate various public buildings in Athens, and also executed three famous pictures illustrating Homeric episodes for the Lesche, a public hall near the temple of Apollo at Delphi, which 600 years later excited the wonder and admiration of Pausanias. These works, however, can scarcely be called historical in the modern acceptance of the word, as the events and objects were indicated rather than represented, and no attempt was made at dramatic development in composition or local truth and circumstantial detail of execution. Other celebrated painters of the Athenian school, of which Polygnotus is considered the founder, and contemporary with him, were Dionysius of Colophon, an excellent portrait painter, of whom Aristotle says "he painted men as they are;" Micon, distinguished for his horses; Panæus of Athens, and Onatas of Ægina. Somewhat later flourished Apollodorus, who about 404 B. C. developed the principles of light and shade. According to Pliny, he was the inventor of tone. Painting, which had hitherto been sculpturesque, now took a more dramatic range, and to the school of Athens succeeded that called the Asiatic or Ionic, of which Zeuxis, Parrhasius, and Timanthes were the chief masters. It constitutes what may be called the second period of Greek painting, the school of Polygnotus forming the first, and was characterized by greater unity of sentiment and action, and a close imitation of the local and accidental appearances of objects. Zeuxis and Parrhasius excelled in the representation of sensuous beauty, and, if inferior in simplicity and expression to Polygnotus, greatly surpassed him in technical details. The "Helen" of Zeuxis was one of the wonders of ancient art, and the numerous pictures by Parrhasius of deities and heroes attained a high importance. Eupompus of Sicyon, the last very distinguished painter of this period, founded about the time of Philip of Macedon the Sicyonian school of painting, characterized by scientific cultivation, artistic knowledge, and great ease and accuracy in drawing, which constituted the third and last phase of Greek painting, or, as it has been called, the epoch of refinement. The form now became paramount over the essence, and technical excellence reached its limit. The chief painters of this time were Pamphilus, chiefly distinguished as a teacher of the theory of his art; his pupils, Apelles, Melanthius, and Pausias, the first preëminent not less for grace or beauty of form than for his power in sublime subjects, the last named one of the first to practise encaustic painting; Protogenes of Rhodes, a rival of Apelles; Nicias, who excelled in light and shade; Euphranor, excellent in many

departments; Nicomachus and Aristides of Thebes, the former remarkable for boldness of execution, and the latter, according to Pliny, the greatest master of expression in all Greece; Theon of Samos, and Athenion of Maronea, besides many others, extending over more than a century. Of these the most famous was Apelles, whose celebrated contest of drawing with Protogenes (each in turn dividing the other's line longitudinally by a thinner line) is frequently cited by ancient critics as an illustration of the degree of technical skill acquired by each artist. From the time of Alexander art rapidly deteriorated, and subsequent to the middle of the 3d century B. C. scarcely another name of note occurs. In the place of mythological or epic stories, the artists painted caricatures, low or domestic subjects of the class called *genre*, and obscene pictures, or contented themselves with reproducing feeble copies of the works of their predecessors. At the period of the Roman conquest painting exhibited little vitality, and the spoliation of public buildings and galleries to adorn the porticoes and temples of Rome tended to crush the art everywhere in Greece. Greek paintings were executed in distemper, with glue, milk, or white of egg, and in encaustic, upon wood, clay, plaster, stone, parchment, and during the latest period upon canvas. Wooden panels with a ground of plaster were most commonly employed, and in the late stages of the art fresco painting attained some perfection. Various species of varnish appear to have been known, and Pliny says that Apelles was indebted for his brilliant coloring to a liquid which he calls *atramentum*, with which he covered his pictures; whence Sir Joshua Reynolds has concluded that he was a master of the art of glazing. Down to the time of Apelles four principal colors were used, white, red, yellow, and black, from which all the necessary hues and tints were composed. The "Aldobrandini Marriage," now in the Vatican, supposed to resemble a picture by Echion of the Sicyonian school, the "Achilles discovered by Ulysses" and "Achilles surrendering Briseïs," both found at Pompeii, and a few others, although probably feeble imitations of older works, sufficiently attest the high character of Greek art in its prime. The mosaic of the *casa del Fauno* at Pompeii, representing the "Battle of Issus," now in the *museo nazionale* (formerly *borbonico*) in Naples, is the finest ancient picture extant, with respect to composition, foreshortening, and perspective.—Of Etruscan painting, as exemplified by specimens found in sepulchral chambers at Tarquinii, Caere, and elsewhere, little need be said. It is essentially Greek in its style and characteristics, and to a limited extent shows similar stages of development and decay.—The Romans received their art directly from Greece, and, though eager and intelligent collectors of the works of the early masters of that country, had no independent school of painting. There does not

seem to have been a single Roman painter of eminence; but inferior Greek artists abounded in the Italian peninsula, and particularly in the capital, and the best Roman paintings were probably executed by them in the degenerate style which marked the decline of the art in Greece. These consisted chiefly of portraits, ornamental or decorative work (under which head may be included landscapes), and copies of the masterpieces of antiquity. The Romans were the first to cultivate portrait painting as a distinct branch of the art. To such a depth of degradation did painting finally descend among them, that it was practised chiefly by slaves, and the painter was estimated by the quantity of work he could do in a day. But the treasures of art accumulated in Rome by successive generals and emperors, from the time of Marcellus downward, made the city, as Cassiodorus has expressed it, "one vast wonder." Most of these were in turn transferred to Constantinople by Constantine and his successors, and the remainder disappeared in conflagrations or in the disorders which marked the period of the exarchate. Not one authenticated painting by any of the great masters of antiquity is now known to be in existence. In one respect the practice of painting in Italy differed from that in Greece. In the latter country the art was essentially religious, and was mainly confined to temples and public buildings; but the Romans early familiarized it with the household, and no dwelling, whether palatial or strictly domestic, was considered complete unless every apartment or portion had its painted decorations signifying the use for which it was designed.—While art in its ancient seats was thus passing through the last phases of what has been called its "age of decrepitude," Christianity had taken root in many parts of the world; and although the new religion, unlike the old, needed no direct alliance with art, and its followers, in their detestation of paganism, denounced the carvers of graven images as servants and emissaries of Satan, the influence of so many previous ages of refinement could not be at once effaced, and the early Christians before the time of Constantine attempted the visible representation of sacred personages and actions, by means of symbols and mystic emblems. Thus the lamb typified Christ; the vine and its branches, Christ and his disciples; the fish, baptism; the ship, the church; and the cross, redemption. But the art even to this limited extent was practised not for the pleasure it would excite, but as a means of inculcating religious principles; and when, as Christianity gained converts, it became safe to venture beyond the limits of mere symbol, and to depict Christ as the Good Shepherd, care was taken to eschew the beauty of features and body lavished by pagan artists upon the representations of their deities. Indeed, while Jewish converts preponderated in the early church, the Saviour was represented, on the authority of certain

passages in the Old Testament, as devoid of all beauty, "not like the gods of the Pantheon catching the eye by outward attractions, but conquering the heart by the power of his word." It was not until the close of the 8th century that Adrian I. decreed, in a papal bull, that Christ should be represented with all the attributes of divine beauty which art could lend him. Nearly a century previous, in 692, the council of Constantinople had authorized the direct human representation of the Saviour in place of the symbolical. The most interesting monuments of Christian art during the first three centuries are to be found on the walls or ceilings of the catacombs of Rome. In the catacomb of St. Calixtus were discovered many representations of Scriptural stories, parables, and symbols, intermingled occasionally with some of the more innocent pagan allegories, and also a portrait of Christ as the Good Shepherd, the earliest known to have been painted, and which probably formed the type for others. Kugler ascribes to these works "much grandeur of arrangement" and "a peculiar solemnity and dignity of style." As distinguished from pagan work of the same or an earlier period, they may be said to exhibit more spirituality in the conception of the human form, holiness of expression and strength of character being preferred to beauty of features or body, and a strong predilection for natural objects, as animals, leaves, or flowers. When the establishment of Christianity by Constantine enabled the pious decorators of the early church to emerge from the gloom of the catacombs, they transferred their labors to the numerous edifices dedicated to the new religion. But before Christian art had time to attain a healthy expansion or assume a distinctive form, civil commotions and barbaric invasions checked its development in Italy, and in the 6th century Constantinople became its principal seat. Mural painting in fresco or distemper now gave way to mosaic work, and for four or five centuries the most interesting remains of pictorial art are the mosaics in the churches and the miniature illuminations of Bibles and other sacred books. (See MOSAIC, and MINIATURE PAINTING.) During the 8th and 9th centuries the iconoclasts of the eastern church pursued a systematic destruction of works of art; but notwithstanding the disfavor into which Greek artists and their works thereby fell, Constantinople remained from the 7th to the 13th century the great capital of the arts, and during that period the Byzantine style was predominant in every branch of them. Byzantine painting was practised almost exclusively for religious purposes, and about the commencement of the 9th century assumed a hierarchical stiffness of type which has descended unaltered to the present day, although genuine Byzantine pictures are now produced only in a few places in Russia and Greece. The characteristics of the school are length and meagreness of limbs, stiffness of figure, features almost void of expression, long

and narrow eyes, a disagreeable blackish green coloring of the flesh, various conventional attitudes and accessories having no foundation in nature, and a profusion of gilding. The colors, though bright, were raw and crude, and commonly painted on a gold background. The painters were monks or persons connected with monasteries, who formed a sort of perpetual craft or guild for the manufacture of pictures; and the subjects were almost as fixed as the style, consisting of the Madonna and child throned, and representations of sacred history or allegory.—The capture of Constantinople by the Venetians in 1204, by promoting a greater intercourse between the Byzantines and Italians, is considered to have given the first impulse toward the revival of the arts in Italy and the West. Many Byzantine painters passed into Italy and Germany, carrying with them their technical methods and their types of form and color, which were followed more or less servilely by the Italians who studied under them; and at Venice, Pisa, and Siena were planted early in the 13th century the germs of what subsequently became the leading schools of Italy. But while in the eastern empire the influence of a slowly expiring faith was still manifest in the manners, the literature, and the art of the people, in Italy, after centuries of turmoil, a new and vigorous civilization, largely impregnated with the Gothic element, but inspired and directed by Christianity alone, had appeared, under which it was impossible that art should not show a new development. The artist, sharing in the religious fervor with which every occupation was pursued, painted for the glory of Christianity and the good of his fellow men, and, finding the shrunken and withered forms of the Byzantine school insufficient for the purposes of his art, was led to a closer imitation of nature. One by one the familiar conventionalisms, which centuries of use had sanctified, were thrown off by bold innovators, until in the early part of the 16th century the culminating glory of the art was reached. The successive steps were slow, and not until the commencement of the 14th century can painting be said to have freed itself in any considerable degree from its Byzantine trammels. Sculpture, under the lead of Nicolo Pisano, the greatest artist of the 13th century, considerably preceded painting in the order of development. The painters were hampered by a mode of treatment handed down to them for centuries, from which it was difficult at once to emancipate themselves; while the sculptors, ignorant as yet of the marbles of the Greeks, were obliged to employ as models the every-day objects which surrounded them. Hence of necessity there grew up among the latter a system of observation and study of nature which soon gave an original character to their works.—To Giovanni Cimabue of Florence, who died about 1302, it has been customary to ascribe the revival of painting in Italy. Giunta da Pisa, who preceded him, was a painter of some

note in his day, but in no respect a regenerator of art; and Guido da Siena, an artist evincing some independence of feeling, and once supposed to have preceded him, is now believed to have been his contemporary or successor. Tuscany, at any rate, was the seat of this revival, and for upward of two centuries the Tuscan schools maintained their ascendancy in Italy. Neither Cimabue nor Guido advanced much beyond the Byzantine traditions, and the chief merit of the former undoubtedly consists in the fact that he discovered and fostered the genius of Giotto di Bondone, the first great painter of modern times, and the true regenerator of the art. With the commencement of the 14th century, the date of this master's first works of importance, the history of Italian painting properly commences; and in tracing its development each of the principal schools will be noticed in succession. The subject has already been treated at some length under the head of **FRESCO PAINTING**, which formed the most important branch of the art in the 14th and 15th centuries; and for the characteristics and chief productions of individual painters the reader is referred to their biographies in this work.—The Tuscan schools, comprising the Sienese, Pisan, and Florentine, were in the 15th century merged in the last named, of which Giotto was the founder. Previous to his time the only real advance in painting was the substitution of the human figure for its mere type or symbol. Giotto made the second great step of progress by rejecting the dark coloring which his predecessors had retained from their Byzantine models, and introducing that which was paler and more natural. His compositions also exhibit freer conceptions of grouping, and his figures more action and variety of position, the result doubtless of the new ideas of form suggested by the works of Nicolo Pisano. He painted in the chief cities of Italy from Naples to Milan, and his mature works, such as the frescoes in the chapel of the Arena at Padua and in the Franciscan church at Assisi, retain no traces of the Byzantine style. His followers and imitators, commonly known as the *Giotteschi*, for the most part confined themselves to the reproduction of the models left by their master, but some pursued the path he had opened to them with results beneficial to the progress of art. Of the latter class were Tommaso di Stefano, called Giotto, Taddeo Gaddi, and Andrea Orcagna, the last of whom has been considered superior in dignity and grandeur to Giotto himself. Contemporary with Giotto, and scarcely less famous, were Simone Memmi of the Sienese school, the characteristics of which seem to have been force of expression and a tendency toward idealism; Pietro and Andrea di Lorenzo, known as the Lorenzetti, and Buffalmacco, of humorous memory, whose exploits as related by Boccaccio have survived almost every relic of his pencil. Other painters of the period were Angelo Gaddi, the son of Taddeo; Spinello Aretino; Cennino Cennini,

author of the oldest Italian treatise on painting; and Francesco da Volterra. None of these advanced much beyond the point reached by Giotto, and at the close of the 14th century his influence was discernible not in Tuscany alone, but throughout Italy and even beyond the Alps. But painting was still in a very undeveloped state. Portraiture was rarely practised, landscape painting as a branch of art was unthought of, and no true standard of form had been established. The purposes to which the art was applied were almost wholly religious, and when subjects from pagan mythology or classic history were introduced, it was to illustrate the truth of Christian revelation or the doctrines of moral theology. Believing that they shared with the clergy the task of instructing the people, the artists aimed at an impressive representation of their subject rather than at technical skill; and on this account their art, imperfect and conventional as it was, exhibits an earnestness and directness of purpose to which the works produced during the splendid era of Raphael can lay no claim. In the 15th century painting advanced very considerably, and toward its close Florence, under the munificent sway of the Medici, became one of the most splendid art capitals of any age. Pietro della Francesca and Paolo Uccello developed the science of perspective, and Masolino da Panicale that of chiaroscuro. The productions of Lorenzo Ghiberti, the sculptor of the famous gates of San Giovanni in Florence, also gave new vigor to the imitative principles established by Giotto; and to his influence perhaps the peculiar excellence of Florentine art may be traced. But to Masaccio, who discarded the conventional types of the human form and made his studies directly from life, is due the credit of establishing the great era of the pictorial art of this century; and until near the time of Raphael his conceptions of form remained the standard. Contemporary with or immediately succeeding him were Fra Angelico da Fiesole, less distinguished for any external quality of art than for the deep religious sentiment of his works; The profligate Filippo Lippi, one of the earliest painters of the naturalistic as distinguished from the mystical school, as that class of masters has been called who made religion the end and object of their art; Benozzo Gozzoli; Filippino Lippi; Antonio Pollajuolo, the first who studied the dead subject for the purposes of design; Domenico Ghirlandaio, the master of Michel Angelo; Cosimo Rosselli, Sandro Botticelli, Luca Signorelli, Andrea Verocchio, and Andrea Castagno, the first Florentine master who practised oil painting after the manner of the Van Eycks. With Leonardo da Vinci, a master accomplished in many arts besides painting, begins another epoch, in which Masaccio's conceptions of form were combined with more forcible and dramatic composition and clearer notions of local color and chiaroscuro, as illustrated in the famous "Last

Supper" in the convent of Santa Maria delle Grazie at Milan. The earnest, simple faith and spiritual treatment of the early painters now gave way in a measure to the realistic tendencies of the age. Less was left to the imagination and feelings, and in place of sacred history and legends of the church, pagan mythology, which the recent revival of classic literature and art had made familiar to the public mind, began to afford subjects to the painter. As in the corresponding period in the history of Greek art, technical excellence was rapidly approaching its highest point, and increasing wealth and luxury multiplied the production of pictures for private purposes. The painter was no longer a public teacher of religion or morals, as in the days of Giotto or Orcagna; and as his public functions were superseded by his private ones, the art began to decline. Undoubtedly the very perfection attained contributed materially to this result. Contemporary Florentine masters of this period were Fra Bartolommeo di San Marco and Andrea del Sarto, both of the highest excellence; Bernardino Luini, whose works are frequently mistaken for those of Leonardo; Bazzi Vercelli, known as Il Soddoma; Lorenzo di Credi; and Michel Angelo Buonarroti, preëminent as painter, sculptor, and architect. This great master neglected illusive effects, despised oil painting, and aimed at the expression of life and power through action and movement; and the almost exclusive attention which he gave to the definition of form, the result doubtless of his cultivation of the three sister arts, made the development of physical qualities thenceforth the chief characteristic of the Florentine school. Of the daring heights to which he attained in his efforts toward grandeur of form and sublimity of expression, the frescoes of the Sistine chapel afford a memorable illustration; although here, side by side with his prophets and sibyls, looking "like beings to whom God has spoken and who have never since ceased meditating on the awful voice," are groups and single figures of such startling novelty of expression and action as to constitute a legacy of questionable value to the student of form. His influence was overwhelming in Florence, and almost every artist who came within its reach lost his individuality, and in attempting to follow him only debased art and proved his own mediocrity. Yet some were excellent painters, including Daniele di Volterra, celebrated for his "Descent from the Cross;" Vasari, the biographer of Italian artists; Sebastian del Piombo, the Zuccari, and Angelo Bronzino. During the first quarter of the 16th century the grand climax of art was reached, and within that period the greatest painters of modern times flourished together, exercising in some sort a reciprocal influence, but each working out his own peculiar aims. Before the middle of the century a steady decline was discernible, not in Florence alone, but all

over Italy, Venice perhaps excepted; and as the great masters one by one dropped off, they were succeeded by crowds of servile mannerists, who painted rapidly and carelessly to meet the increasing and not very discriminating demand for pictures, and whose works, even when devoted to sacred subjects, had in them "more of earth than of heaven." "We paint six pictures in a year," says Vasari, "while the earlier masters took six years to a picture;" a remark which his own practice strikingly illustrated. The latter part of the century, however, witnessed a fresh development in the Florentine school, and Ludovico Cardi, called Cigoli, introduced a new style, distinguished by careful drawing and brilliant coloring; but few names of note occur among his followers, except that of Carlo Dolci, a careful painter of female heads. Pietro da Cortona about the middle of the 17th century introduced a florid, ornamental style of fresco painting, the followers of which were called by the Italians the *machinisti*. Little can be said of Florentine painting after this.—Painting seems to have made little progress in Venice previous to the time of Giotto, and during the 14th century no works of any considerable importance were produced. Indeed, the Byzantine style, which its painters exclusively practised, continued in favor for upward of a century after the Florentines had renounced it. The little island of Murano may be considered the nursery of Venetian art, and Giovanni and Antonio da Murano, with their pupils Bartolommeo and Luigi Vivarini, its first masters. Commercial intercourse had familiarized them with the works of German and Flemish painters, the rich and vivid coloring of which was readily adopted by contemporary Venetian artists, although until near the middle of the 15th century they designed with an antique severity borrowed from their neighbors the Paduans. Gentile and Giovanni Bellini, sons of Jacopo Bellini, were the first great artists of the school, as they were among the first in Italy to substitute oil painting for distemper. With a tendency to elaborate finish, and a dry though correct manner, their works are distinguished by sweetness and purity of expression, and afford a foretaste of that rich coloring which subsequently became the chief characteristic of Venetian art, and which reflected the cheerful and festive spirit of the people. With the opening of the 16th century commenced a new epoch in the history of the school, and the genius of two scholars of the Bellinis, Giorgione and Titian, created a style in which a bold and decided handling, and a "golden glow" of color, with great truthfulness of detail in landscape, draperies, and other accessories, were marked features. The former died early, but Titian, who long survived his great contemporaries of the early part of the century, reached the summit of his art in history, landscape, and portraiture, and stamped the school of Venice as incontestably the first

in color. Aside from portraiture, in which he had no rival, he was perhaps greatest in his representations of the nude female form. Among his contemporaries or imitators were Giovanni Antonio da Pordenone, who is thought to have rivalled Titian as a colorist, Palma Vecchio, Paride Bordone, Andrea Schiavone, and Alessandro Bonvicino, called Il Moretto di Brescia. In the latter half of the century flourished three other painters scarcely less illustrious than Titian, viz., Jacopo Robusti, called Tintoretto, Paolo Cagliari, called Veronese, and Giacomo da Ponte, called Bassano; the first one of the most vigorous and rapid of painters, but unequal in his performances; the second a consummate master of color, delighting in scenes of festive pomp and splendor, with rich costumes and architecture; and the third the earliest and one of the best of the Italian painters of genre. The true Venetian style of these masters deteriorated in the hands of their successors, and the subsequent history of the school is unmarked by a single great name, though artists of merit were not uncommon.—Intimately connected with the history of the early Venetian school was that of Padua, to which a fresh impulse was given in the first half of the 15th century by Francesco Squarcione, whose collection of drawings and casts from the antique greatly promoted the cultivation of form, and influenced the art throughout northern Italy. Jacopo Bellini of Venice acquired there his peculiar dry manner, and Andrea Mantegna, the greatest painter that had appeared in the north of Italy up to the middle of the 15th century, was its most eminent pupil. The latter, distinguished for his severely classic and statuesque design, founded the Mantuan school, which produced many of the most famous painters of Lombardy.—The Roman school may be said to have sprung directly from the Umbrian, so called from the ancient district of Umbria, within the limits of which its artists practised their vocation. The region was secluded and the inhabitants remarkable for religious enthusiasm; whence perhaps the severe, ascetic style of its early painters. The most distinguished among these were Pietro Cavallini, Gentile da Fabriano (whose style Michel Angelo declared was like his name, *gentile*), and Piero della Francesca, after whom came Pietro Perugino, by far the best painter of his school up to his time, and whose style, though wanting in vigor, was distinguished by *naïveté*, grace, and tenderness of expression. His pupils were numerous, including Pinturicchio, Andrea Luigi, called L'Ingegno, and above all Raphael (Raffaello Sanzio d'Urbino), whose fame has overshadowed the rest. He has been described as “the first of painters, for moral force in allegory and history unrivalled; for fidelity in portrait unsurpassed; who has never been approached in propriety of invention, composition, or expression; who is almost without a rival in design; and in sublimity and grandeur inferior

to Michel Angelo alone.” In separate qualities he may have been equalled by some contemporary painters, and in color, which he regarded as a means and not an end in painting, he was inferior to the Venetians; but his frescoes in the Vatican, his Madonnas and holy families, his great altarpieces, and his cartoons nevertheless represent the highest efforts of modern art, and have made his style not that of Rome alone, but of the world. Raphael had numerous pupils, who imitated him, and some of whom assisted him in the execution of his frescoes. But after his death (1520) most of those who had original genius deviated into exaggerations and insipidities, and soon lost all traces of the noble grace and power of their master. The sack of Rome by the constable de Bourbon in 1527 caused the dispersion of his followers then in the city, who carried into all parts of Italy a spurious style, miscalled the “Raphaelesque.” His best pupils were Giulio Romano, the most distinguished of all for original power, but of a far lower order of mind than his master; Gian Francesco Penni, called Il Fattore; Perino del Vaga; Giovanni da Udine; Polidoro da Caravaggio; Pellegrino da Modena; Bartolommeo Ramenghi, called Bagnacavallo; and Benvenuto Tisi, called Il Garofalo. Primaticcio, Nicolò dell' Abbate, and Tibaldi also acquired the Roman style of Raphael, which they carried into France and Spain. The execution by Michel Angelo of the “Last Judgment” in the Sistine chapel in 1541 produced a crowd of feeble imitators of his style; after whom came Giuseppe Cesari d'Arpino and Michel Angelo Caravaggio, the former representing the *machinisti* and the latter the *tenebroso* or *naturalisti*, whose style, though not deficient in power, was founded on mere natural imitation, and was characterized by coarseness and vulgarity. These were succeeded by the Carracci and their followers, who flourished during the 17th century; and in the 18th the history of the art closes with Andrea Sacchi, Carlo Maratti, and Raphael Mengs, the first a painter of merit, the last two academic and mannered.—The Bolognese school, though claiming to share with those of Tuscany, Rome, and Venice the honor of bringing about the revival of painting, presents no name of great importance until the close of the 15th century, when Francesco Francia, a painter of genuine religious sentiment, and the friend of Raphael, flourished. His influence was only temporary, and it was not until about 1585 that the school witnessed its most brilliant epoch in the establishment by Ludovico, Agostino, and Annibale Carracci of their celebrated academy, called, from the principles on which it was conducted, the eclectic school of Bologna, and the fundamental idea of which was to combine the closest study of nature with the imitation of the best qualities of the old masters. The Carracci and their chief pupils, Domenichino, Guido Reni, Lanfranco, Albani, and Guercino, extended

their influence throughout Italy; but their efforts only tended to substitute academic tameness for what little originality survived the decline of painting, and their style, though frequently admirable as illustrated by themselves, did not long survive them. Their greatest merit perhaps consisted in the attention they gave to landscape.—Of the schools of northern Italy, in addition to those mentioned, the most noted was that of Parma, the great ornament of which was Antonio Allegri, known as Correggio, who in the early part of the 16th century brought the art of *chiaroscuro* and relief to perfection. One of his chief characteristics was a winning softness and grace, tending in some instances toward affectation; and the evil consequences of this tendency are visible in the works of Francesco Mazzuola, called *Il Parmigiano*, otherwise an excellent painter, and after Correggio the best artist of the school.—At Milan a flourishing school was established by Leonardo da Vinci, who executed there some of his finest works. Among the pupils who came under his influence may be mentioned Marco d'Oggione, who painted the copy of Leonardo's "Last Supper," now in the possession of the British royal academy. About the commencement of the 17th century the Procaccinis founded an eclectic school in Milan.—The school of Naples claims an antiquity equal to that of Florence, but no important name occurs until the 17th century, when Giuseppe Ribera, called *Lo Spagnoletto*, and Salvator Rosa, both leading painters of the *naturalisti*, flourished. The latter was one of the earliest and most vigorous of landscape painters, but even in this class of works reflects the coarse feeling of his school. The last Neapolitan painter of eminence was Luca Giordano, called, from his rapidity of execution, *Fa Presto*.—Although painting in Germany can be traced back to the Carolingian period, little is known of the productions of its artists, the missal illuminators excepted, previous to the 13th century. During the latter half of the 14th, under Meister Wilhelm, or William of Cologne, who, according to a contemporary chronicler, was "the best painter in all German lands, and painted all sorts of men as if they were alive," the school of Cologne acquired considerable repute. The pictures in Cologne attributed to this master and to his pupil, Meister Stephan, notwithstanding a Gothic hardness peculiar to all mediæval German art, are remarkable for richness of coloring, careful finish, and deep religious sentiment. Contemporary schools flourished in Nuremberg and Swabia. The 16th century witnessed the culmination of German art in the person of Albrecht Dürer, the pupil of Michael Wohlgemuth of Nuremberg, and almost equally distinguished as painter, sculptor, and engraver, though now chiefly known in the last capacity. Another painter who greatly influenced him was Martin Schön, remarkable for the fantastic spirit often noticeable in his works. Lucas Cranach about the same time headed the con-

temporary school of Saxony, and enjoyed almost as great a reputation as Dürer himself. Other painters of the period were Albrecht Altdorfer, a pupil of Dürer, Matthias Grünewald, Hans Burgkmair, and particularly Hans Holbein the younger, in whom the old mediæval ecclesiastical spirit is relieved by freer conceptions of nature and a purer sense of physical beauty, while the characteristic German style is retained. From 1527 his history belongs to England. Subsequently the Germans became imitators of the Netherlandish and Italian eclectic schools, and previous to the 19th century few names of note occur among them. In the first decade of the present century a remarkable revival was commenced by a number of young German painters assembled in Rome, the leading motive of which was a protest against the effete academic generalization under which art languished. The result was the formation of a mystical school, which, under the lead of Overbeck, attempted to revive the sentimental, ascetic art of the 14th century; and of another more purely Teutonic, known as the Munich school, whose leaders, Cornelius, Schadow, Veit, Kaulbach, Hess, and Schnorr, have affected monumental works and idealized history with considerable success. By pushing this tendency to somewhat unreasonable limits they incited a realistic reaction under Lessing, Bendemann, and others, who formed a separate school, the chief seat of which is Düsseldorf. It has produced some clever genre painters. Within a few years a more broadly realistic school has been established in Munich under the lead of Karl Piloty, a coarse but vigorous painter. Accounts of these movements and of their instigators will be found among the biographical articles of this work.—The Flemish school dates from the commencement of the 15th century, when Hubert and Jan van Eyck established themselves at Bruges, and drew around them pupils from all parts of northern Europe. Dignity and strength, combined with a close imitation of external nature, were the characteristics of their style, as illustrated in the celebrated polyptych painted by them for the church of St. Bavon in Ghent. This work presents also some of the first successful attempts at landscape painting. To Hubert van Eyck is due the discovery, not of oil painting, which was practised for two or three centuries before his time, but of a drying varnish, which was at the same time more suitable for mixing with pigments than any vehicle previously known. The new method was adopted by northern artists generally in the first half of the 15th century, and about 1450 was carried into Italy by Antonello da Messina. Among the pupils and successors of the Van Eycks were Roger van der Weyden, also called Roger of Bruges, Hans Memling or Hemling, perhaps the best painter of the school, and Jan van Mabuse, the first Flemish painter who felt the influence of the Italian renaissance. A contemporary school flourished at Antwerp, which

previous to the middle of the 16th century produced at least two first rate artists, Quentin Matsys or Messys and Lucas van Leyden; to these succeeded a crowd of imitators of the Italians, whose efforts in design were worthless, and who fell far short of the solemn, religious feeling of their Flemish predecessors. With the 17th century commenced the most brilliant epoch of the Flemish school, during which the genius of Peter Paul Rubens, whom Haydon characterizes as "a giant of execution and brute violence of brush, and brilliant color and daring composition," revived the old glories of Florence and Venice. Physical energy and life were his characteristics, and these were reflected with somewhat exaggerated coarseness in the works of Jordaens, Gaspar de Crayer, and others of his followers, who form what is known as the school of Brabant. Anthony Vandyke, his most illustrious pupil, however, painted with more elegance than his master, and brought portraiture to the highest excellence. Painting languished in Flanders and Brabant after the latter part of the 17th century, but, as in other parts of Europe, has within the present century experienced a revival, which will be productive of good results. The art has been pursued with success by Baron Leys, Wappers, De Kaiser, Gallait, Verboeckhoven, Alfred and Joseph Stevens, Willems, Alma Tadéma, and other Belgian artists. Gallait especially ranks among the first of living historical painters, and Alma Tadéma, for several years a resident of London, excels in dramatic representations of ancient history and manners. —The Dutch school seems to have been identical with the Flemish until the early part of the 17th century, when a peculiar reaction from the mannered style of the masters of the preceding century manifested itself in Holland. This movement was headed by Paul Rembrandt van Ryn, a man of singular genius, who took up a hostile position against the study of the ideal, and deliberately attempted the imitation of vulgar nature. The ugliness of his models, selected apparently to show what obstacles he could overcome, is more than redeemed by surpassing effects of light and shade, and his mean and coarse design but thinly veils the individuality of a gloomy and original mind. His style, called by Kugler the "phantasmagoric," was the very opposite of that of Rubens, and in landscape and history completely severed the Dutch school from that of Brabant. Among his eminent pupils were N. van Bergen, Eeckhout, P. de Koninck, F. Bol, and Nicholas Maas. Contemporary with Rembrandt was a class of painters of remarkable merit as colorists, and well versed in the technics of their art, who cultivated *genre* (a term applied to all kinds of real or imaginary scenes from common life). Their pictures are generally small and exact representations of familiar and often vulgar subjects. Among the most eminent of these were Peter Breughel and his sons Hell Breughel, so called from the diabolical char-

acter of his subjects, and Velvet Breughel, famous for his soft handling; David Teniers, the elder and the younger, the latter a distinguished painter of low life; Adrian van Ostade, Adrian Brauwer, Frans Hals, and Jan Steen, equally celebrated in the same department; Gerard Terburg, Gerard Douw, Gabriel Metz, and Franciscus Mieris, eminent painters of genteel life. Several of these, as for example Teniers, father and son, belong properly to the Flemish school; but as they followed the Dutch style, they have been classed among the Dutch painters. About the same time landscape painting became developed among the Dutch with wonderful rapidity, and generally with a purer taste than *genre*. Paul Bril caught the Italian spirit from painting in Italy, and Jan and Andreas Both, Pynacker, Albert Cuyt, Nicholas Berghem, Jan Miel, Karel Dujardin, and Adrian van der Velde cultivated an ideal or pastoral style with eminent success. Jacob Ruysdael, Minderhout, Hobbema, and Antony Waterloo excelled in vivid and natural imitations of native scenery, without aiming at ideal beauty; Willem van der Velde the younger and L. Backhuysen in marine views; Philip Wouwerman in hunting parties; and Paul Potter in landscapes with cattle and figures. Snyders, the friend of Rubens, and a famous animal painter, may be mentioned here; also Hondekoeter, a painter of poultry; and De Heem, Rachel Ruysch, and Van Huysum, celebrated for their fruit and flower pieces. A few of these lived into the 18th century, but before that time the art had lost most of its vitality. Of late years it has been practised with success by Israels, Van Schendel, and the Koekkoek family, the last named eminent in landscape. —The Spanish school stands almost alone in the history of European art in the severely religious and ascetic character of its productions. A rigid code of rules, established by ecclesiastical authority, prescribed the method of treatment when sacred subjects were selected, and the strong devotional feeling of the artists led them to give an almost exclusive attention to this class of subjects. Painting can scarcely be said to have had an existence in the Spanish peninsula previous to the middle of the 15th century, and it was not until the 17th that the school had any other than a local reputation. The visit of some Flemish artists in the 15th century, and somewhat later of Titian and other Italian masters, gave the native painters their first practical ideas of color and design. In the 16th century schools were already established in Castile, Valencia, Seville, and elsewhere, that of Seville being perhaps the most distinguished. Among the eminent painters connected with them were Antonio del Rincon, Luis de Vargas, Luis de Morales, Vicente Juanes, sometimes called the Spanish Raphael, Pablo de Cespedes, Francisco Ribalta, and Juan de las Roelas, most of whom studied in Italy, and flourished in the 16th century; Franciscus Pacheco; Alonso Cano, eminent as sculptor,

painter, and architect; Francisco Zurbaran, a distinguished painter of the naturalistic school of Caravaggio; and Diego Rodriguez de Silva y Velazquez and Bartolomé Estéban Murillo, who share the honor of making Spanish art known and admired in all parts of the civilized world. The characteristics of their styles are described in the biographical notices of them. Since the commencement of the 18th century Spain has produced few painters of eminence. —Painting was practised in France as early as the time of Charlemagne, and during the 14th and 15th centuries French illuminators did much excellent work; but nothing like a national school can be said to have had an existence until after the visit of Primiticcio and other Italian artists, at the invitation of Francis I. The only painter of independent or national feeling who preceded them was Jean Cousin, noted for an elaborate representation of the last judgment. Simon Vouet, who flourished in the earlier half of the 17th century, received an Italian education, and is considered the master and model of the succeeding generation of French painters. Contemporary with him were Nicolas Poussin, eminent for the classic spirit of his compositions and his landscapes; Gaspar Poussin, also eminent in landscapes; Claude Gellée, known as Claude Lorraine, a master of aerial perspective, as of nearly every other branch of landscape painting; and Sébastien Bourdon. All of these, though French by birth, practised their art and passed most of their lives in Italy. Eustache Lesueur and Charles Le Brun were the most eminent of Vouet's pupils; the latter, an artist of merit despite his affectation of manner and violations of taste, being the painter of many of the immense pictures at Versailles which testify to the vanity and extravagance of Louis XIV. In the succeeding reign Antoine Watteau painted *fêtes galantes* with grace and effect; François Boucher, an artist of considerable natural force and ability, gained an unenviable reputation by producing works conceived in the worst taste, and which violated all notions of truth or decency; Joseph Vernet was noted as a marine painter; and somewhat later Jean Baptiste Greuze obtained a unique reputation for his female heads and charming representations of domestic life. Painting steadily deteriorated during the latter half of the 18th century, until restored to a temporary vitality about the time of the French revolution by Jacques Louis David, whose style, known as the "classic," though dry, pedantic, and deficient in true expression, showed considerable mastery of form, and was followed by Guérin, Drouais, and a numerous band of pupils. Gros first broke away from this "morbid imitation of the antique," as it has been called, and with Géricault and others inaugurated the system of painting from nature whence originated the modern French realistic school. Contemporary with Géricault was Eugène Delacroix, a vigorous colorist, who founded a ro-

mantic school, the followers of which seem to have drawn their inspiration from the writings of Goethe, Byron, and Scott. Among the painters who flourished during the first quarter of the present century were Ingres, a pupil of David, and a refined classicist; Isabey, noted for his miniatures; Prud'hon, Robert Fleury, and Léopold Robert. Horace Vernet, who died in 1863, was a facile painter, of fine invention and unrivalled in battle pieces; his son-in-law, Paul Delaroche, became one of the chief masters of history of the century; and Ary Scheffer stood almost alone as an idealist of singular purity and severity of conception. The French school of the present day, if less aspiring than that of David and less broadly realistic than that founded by Gros and Géricault, is distinguished by correct drawing and composition, and generally by elaborate finish, although in the latter particular the practice of its members is by no means uniform. The prevailing style is genre, and subjects are often trivial, but dramatic power is by no means wanting. In respect to the technical qualities of the art, painting is now practised in France with more success than ever before, and in this regard the French school is perhaps the best extant. Among the principal masters in genre and history may be mentioned Meissonnier, whose pictures, small and simple in detail, are admirable for character and execution; Gérôme, noted for dramatic expression and elaborate finish; Édouard Frère; Jules Breton; Couture; Zamacois and Millet, both lately deceased, and both of high excellence; Hamon, Cabanel, Hippolyte Flandrin, Decamp, Bouguereau, Hébert, Bonnat, Fromentin, Pils, Yvon, and Fortuny, a Spaniard by birth, whose recent death is a severe loss to modern art. Gustave Doré has exhibited considerable talent in grotesque or fantastic subjects, but is considered to have failed in his more ambitious undertakings, such as the illustration of the Bible and Dante. Gustave Courbet is a realist of singular power, and Rosa Bonheur occupies an important position as an animal painter. In the department of landscape a high place must be assigned to Troyon. Other artists famous in that department are Rousseau, Corot (died in 1875), Daubigny, Diaz, and Lambinet.—Of painting in England little can be said previous to the 18th century. Jan Mabuse, Holbein, Sir Anthony More, Rubens, Vandyke, Lely, Kneller, and other continental painters, had during the two previous centuries successively practised their art there, principally in the department of portraiture; but their influence was unavailing to form a national school. The few native artists of note who flourished within this period, including Hilliard, Isaac and Peter Oliver, miniature painters, and Dobson, Nicholas Stone, and Jameson, called the "Scottish Vandyke," were portrait painters, and that branch of painting alone received encouragement. The first important historical works by an English ar-

tist were the frescoes executed by Sir James Thornhill in the interior of the dome of St. Paul's, London; but his illustrious son-in-law, William Hogarth, the great satirical painter of his time, and one of the most original artists of any age, is the first name of note in the history of British art. He had however but little direct influence upon the painters of his time, and the honor of founding the modern English school belongs to Sir Joshua Reynolds, excellent in portraiture and history, and preëminent as a colorist. His contemporary and rival, Thomas Gainsborough, often equalled him in portraits, but is better known as the first of the line of landscape painters whose works would adorn the art of any epoch. Among other painters who flourished during the latter half of the last century were Richard Wilson, eminent in landscape; Barry, Romney, Mortimer, Opie, Northcote, Fuseli, Angelica Kauffmann, Copley, and West, historical and portrait painters, the last two being natives of America. William Blake occupies a unique position as a mystical painter of remarkable but unequal power. The influence of Reynolds upon the succeeding generation of painters is shown in the strong bias for color which now forms one of the chief characteristics of the English school. In the first quarter of the present century flourished Sir Thomas Lawrence, Hoppner, Raeburn, and Jackson, portrait painters; Wilkie, next to Hogarth the best painter of low life England has produced; Haydon, a historical painter of genius, in spite of his mannerism and egotism; Ety, once esteemed as a colorist; Turner, the most original and imaginative, perhaps, of landscape painters; Constable, Callcott, W. Collins, Morland, Nasmyth, Bonington, eminent in the same department; and John Martin, whose architectural extravagances and exaggerated effects of light and shade had a brief popularity. During the same period history and genre were cultivated by Bird, Smirke, Stothard, and others; and they have been continued to the present day by Newton, Leslie, Cooper, Mulready, Maclise, Eastlake, Redgrave, E. M. Ward, Webster, Hamilton, Cope, Dyce, C. Landseer, J. R. Herbert, Horsley, W. J. Muller, Frith, Faed, and others, many of whom have also painted landscapes and portraits with success. Among prominent landscape painters of the present period have been Creswick, Stanfield, D. Roberts, James Ward, the Linnels, father and sons, and F. Lee; and the English school of landscape still occupies a high place in contemporary art. Sir Edwin Landseer (died in 1873) held a peculiar and prominent position as a painter of dogs and animals of the chase. The British school of water-color painting, founded by Paul Sandby in the middle of the last century, is perhaps the best in the world, and in the department of landscape has produced works scarcely inferior to those of the oil painters. Among its chief artists are Turner, Prout, Copley Fielding, Roberts, W. Hunt,

Lewis, Cattermole, Cox, Absolon, Corbould, Nash, and Stanfield. At the beginning of the century a tendency toward imaginative painting on a large and elaborate scale, otherwise known as "high art," was a marked characteristic of the English school. Domestic genre gradually took the place of this, and has been the prevailing style to the present day. So exclusive a devotion to one class of subjects has imparted a monotonous sameness and overstrained sentimentality to the recent productions of the school; but an ideal and more imaginative style has of late been cultivated by Leighton, Holman Hunt, Millais, Watts, Watson, Calderon, Walker, Sant, Whistler (the last named an American by birth, and a remarkable colorist), and some others. Within the past 25 years has arisen a peculiar school, styling itself the "Pre-Raphaelite Brotherhood," and represented by Holman Hunt, Millais, Dante Gabriel Rossetti, and some others, who, according to their most earnest advocate, Ruskin, "oppose themselves to the modern system of teaching, and paint nature as it is around them, with the help of modern science, and with the earnestness of the men of the 13th and 14th centuries."—Painting made little progress in the United States previous to the present century. Benjamin West, a native of Pennsylvania, and the second president of the British royal academy, gained all his reputation abroad; and Copley, though he left many admirable portraits in America, settled in England before the revolution, and produced his most important works in history and portraiture in that country. Charles Wilson Peale and John Trumbull were the first native artists of note who practised their art to any considerable extent at home; and the Trumbull gallery of portraits and pictures illustrating American history, at New Haven, comprises a valuable contribution to the early art of the nation. In the first part of the present century Malbone, Gilbert Stuart, and Allston vindicated the claim of America to the possession of a high order of artistic ability; the first an excellent miniature painter, the second a rival of Reynolds in portraiture, and the third an imaginative painter of great excellence in all walks of his art. About the same time John W. Jarvis and Thomas Sully occupied a respectable position as portrait painters; Vanderlyn painted history with success; and somewhat later Newton and Leslie, Americans by birth or parentage, settled in England and became celebrated in the modern English school of genre. About 1825 Thomas Cole founded what may be called the American school of landscape painting, a department which has since been cultivated by native artists more universally than any other. The works of Cole, though not remarkable as literal transcripts of individual forms, are characterized by a thoughtful morality and a tendency to allegory. The series of "The Course of Empire" and "The Voyage of Life" are his

most elaborate productions. Contemporary with Cole or immediately succeeding him were Doughty, Durand, Inman, and Fisher, the two first named eminent in landscape, and the third the first American painter who attempted genre with success; Rembrandt Peale, Weir, Huntington, Rothermel, and Page, painters of history, portraits, landscape, and genre, and the last named distinguished as a colorist; Neagle, Morse, Ingham, Harding, and Fraser, portrait painters. Since the middle of the century American painters have devoted most attention to landscape and genre, and their efforts have in a measure reflected the influence of the French school. French paintings predominate in the private collections of the country, and French types of form, color, and design have been reproduced with such modifications as national tastes and habits of thought have rendered necessary. The influence of other modern schools is so slight as to be almost inappreciable. Landscape has been pursued, as a rule, from a purely realistic point of view, American painters in this department seldom aiming to give more than a literal, if sometimes an exaggerated, transcript of nature. Prominent among painters of this class have been Church and Bierstadt, both remarkable for the production of grand and elaborate pictures on an extensive scale; Kensett, whose peculiar mannerism often carried him within the realm of the ideal; Inness, a follower of the French landscapist Rousseau; James M. and William Hart, Cropsey, Casilear, R. S. and S. R. Gifford, G. L. Brown, Bristol, S. Colman, W. T. Richards, Tilton, Tiffany, McEntee, Whittredge, Cranch, La Farge, Griswold, Smillie, Sonntag, Thomas Hill, Mignot, T. Moran, Gay, Gignoux, Wyant, Gerry, Bellows, Shattuck, Bricher, Hubbard, Fitch, and Yewell. Among marine painters may be mentioned E. Moran, De Haas, Dana, Haseltine, Bradford, and Dix. Portraiture has been pursued with success by Elliott, W. M. Hunt, Baker, Healy, Le Clear, W. O. Stone, Hicks, H. P. Gray, Staigg, Ames, Flagg, and others. History and genre are represented by Eastman Johnson, Winslow Homer, Leutze, J. F. Weir, E. White, Mount, May, Powell, Darley, Guy, Lambdin, Hennessey, G. H. Hall, J. G. Brown, Perry, T. W. Wood, Vedder, Terry, C. C. Coleman, and Freeman; and J. H. and W. H. Beard, Butler, P. Moran, Hays, Tait, and Hinckley are noted as painters of animals.—The works of Vasari (Florence, 1550 *et seq.*; translated into English by William Aglionby, 4to, London, 1719, and by Mrs. Jonathan Foster, 5 vols. 8vo, 1850-'53), Ridolfi (Venice, 1648), Lanzi (Florence, 1792), and other Italian writers are mainly the basis of modern works on the Italian painters and schools. See Bryan, "Biographical and Critical Dictionary of Painters and Engravers" (2 vols. 4to, London, 1816; revised and enlarged by Stanley, 1849), and Otteley's supplement (1866); Kugler, *Handbuch*

der Geschichte der Malerei von Konstantin dem Grossen bis auf die neuere Zeit (2 vols., Berlin, 1837; the portions relating to different schools translated into English by Eastlake, Head, and Waagen); Ruskin's "Modern Painters" (5 vols., London, 1843-'50); Lindsay, "Sketches of the History of Christian Art" (3 vols., 1847); Stirling, "Annals of the Artists of Spain" (3 vols., 1848); Charles Blanc, *Histoire des peintres de toutes les écoles* (1849-'69); Burckhardt, *Der Cicerone: Anleitung zum Genuss der Kunstwerke Italiens* (Basel, 1855; revised and enlarged by A. von Zahn and translated into English by Mrs. Clough, 1873); Crowe and Cavalcaselle, "Notices of Early Flemish Painters" (London, 1856), "History of Painting in Italy" (3 vols., 1866), and "History of Painting in North Italy" (2 vols., 1871); Mrs. Jameson's "Memoirs of the Italian Painters" (revised ed., 1859); Lübke, *Grundriss der Kunstgeschichte* (Stuttgart, 1861); Waagen, *Handbuch der Geschichte der Malerei* (1862 *et seq.*); Wornum, "Epochs of Painting" (London, 1864); Redgrave, "Century of Painters of the English School" (2 vols., 1866), and "Dictionary of Artists of the English School" (1874); Tuckerman, "Book of the Artists" (New York, 1867); Hamerton, "Contemporary French Painters" (London, 1867); and Meyer, *Allgemeines Künstler-Lexikon* (Leipsic, 1872 *et seq.*).

PAINTS, coloring substances prepared so that they may be spread with a brush, to color or preserve surfaces. The term is usually applied to mixtures of pigments with oil, but may include those with water and gum or other thickening material. The pulverized solid pigments are called the base, and the liquid is called the vehicle, while a third material may be added to give color. Paints which are used by artists are often called "colors," but they only differ from common paints in that their materials are selected with more regard to permanence of color and fineness. For ordinary house painting, especially for exteriors, white lead is generally regarded as the best base, and boiled linseed oil as the best vehicle. The boiling prepares it, especially when a small portion of litharge (protoxide of lead) is added, to become hardened by oxidation. If white lead paint is exposed to exhalations of gases containing sulphuretted hydrogen, the surface will become converted into a black sulphide, which would cause discoloration in any except a black or dark brown paint. Zinc white, or oxide of zinc, as it does not become tarnished in this way, is often used as a substitute in white paint, especially for interior painting. White lead, however, makes the strongest paint, forming when dry a homogeneous solid, because it combines chemically with the oil, while the zinc white is only held mechanically by it; and lead is therefore to be preferred for outside work. It should be selected with care, because it is often largely adulterated with ground sulphate of baryta or

heavy spar, which destroys its opacity and also its affinity for the oil, so that it soon washes away. Sulphate of lime, or gypsum, and chalk are also sometimes used as an adulteration for white lead, and zinc blende is sometimes used as a substitute, and is said to cover well. The finest white leads are made at Krems in Lower Austria, and their preparation is attended with great labor. Next to these the Dutch and English white leads are regarded with the most favor; the former have the greater opacity, but are said to be rather more apt to become yellow by age than the English. The most durable paints intended for covering ordinary objects are made with white lead as a basis, the coloring being given by other materials, such as lampblack, umber, ochre, red lead, vermilion, verdigris, &c.; although cheap paints are sometimes made by mixing oils, particularly those that are cheap, such as fish oils and petroleum, with fuller's earth, ochre, or lime. It has been asserted that the use of zinc in place of white lead relieves the workman from disease; but the effects of zinc under similar circumstances have not perhaps been sufficiently observed to form a correct opinion.—The following are some of the finer paints, called artists' colors. Flake white is made of carbonate of lead with an excess of oxide, mixed with boiled linseed oil, to which is often added a varnish. By the Krems, and also by the Dutch process of manufacture, white lead is rendered amorphous and very opaque, in consequence of the oxide of lead being in excess, a portion of the carbonic acid being replaced by water. Silver white is a term applied to a similar kind of white lead, and some whites are called Roman and Venetian. The whites of bismuth, zinc, tin, and barytes are of too feeble opacity. Strontian yellow is a color in which the base is chromate of strontia, of a pale canary color, resisting the action of foul gases and light, and being perfectly durable. Cadmium yellow, sulphuret of cadmia, is a rich and brilliant orange, and also resists the action of foul gases and light. There are other yellows, such as the chromates of lead; Naples yellow, made of the oxides of lead, antimony, and zinc; yellow orpiment, sulphuret of antimony, forming the base of King's yellow; the zinc yellows, and the chromates of cadmium, mercury, and barytes. These are objectionable on account of want of durability, either from blacking by sulphuretted hydrogen, or for changing color from disintegration and other causes. The native earths, or ochres, such as yellow, Oxford, Roman, stone, brown, and Sienna, consisting of silica and alumina, colored by oxide of iron, are permanent colors, and furnish the painter with some of his soundest materials. Indian red, made of a native silicate and oxide of iron, is also a durable and valuable color. Venetian red is an inferior kind of Indian red. Vermilion, cinnabar, or sulphide of mercury (HgS , formerly called bisulphide), is a permanent paint

of a beautiful red, and not affected by acids or alkalies. The madder lakes, which are vegetable dyes mixed with earthy bases, are rich and beautiful colors; but all vegetable compounds should be regarded with suspicion, although madders have the best reputation. Palladium red, ammonio-chloride of palladium, is a rich, deep, beautiful red, and a valuable pigment, but not much used. Ultramarine, made from native lapis lazuli, or artificially by heating together kaolin, carbonate of soda, and sulphur, is a brilliant purplish blue, not destroyed by foul gases or light, and, although affected by acids, is durable for the painter. There are many processes for artificial ultramarine, and a method has been found by Prückner (see "Colors in Painting," by Riffault, Vergnaud, and Toussaint, Philadelphia, 1874) to determine their durability by treatment with hydrogen. Silicate of cobalt and potassa form cobalt blue, but it is not so strong a pigment as ultramarine. Prussian blue is liable to change, and indigo fades in the light. Chromium green, sesquioxide of chromium, made by strongly igniting chromate of mercury, is a strong, opaque, permanent light green; it is the coloring matter of the emerald. Scheele's green, arsenite of copper, verdigris, a mixture of subacetates of copper, and other mineral greens, are not considered as durable as chromium green; many of them form black sulphides by continued action of foul air. Terre verte, a native silicate of protoxide of iron, with water, potash, and magnesia, is a delicate green, resisting all ordinary destructive agencies, but destroyed, like ultramarine, by acids. Vandyke, Rubens, Cassel, and Cologne browns are made of decomposed vegetable and bituminous matter, and are deep and rich, with a certain degree of translucency, for which they are valued. Ivory black, or burnt ivory, is a pigment much used by painters; also lampblack, and the blue blacks, made of burnt vine twigs, and that of the ancients made of the lees of wine. Manganese black, peroxide of manganese, and black ochres or earths are also used.

PAISIELLO, Giovanni, an Italian composer, born in Taranto, May 9, 1741, died in Naples, June 5, 1816. He was educated in the conservatory of St. Onofrio at Naples under Durante, and at the age of 20 was a prolific composer of masses, psalms, motets, &c. His first opera was produced in 1763 at Bologna, and during the next 13 years he is said to have composed upward of 50 for the chief cities of Italy. Most of these speedily sunk into oblivion. The most celebrated of his earlier operas was *Dal finto al vero*. In 1776 he accepted an invitation from Catharine II. to establish himself in St. Petersburg, where he remained nine years, producing several operas and oratorios, and a variety of miscellaneous pieces. Some of his best works belong to this period, particularly *Il barbiere di Siviglia*. Going to Vienna, he composed for the emperor Joseph II. 12 symphonies, and the opera buffa

Il re Teodoro, which affords the first instance of the use of the finale in this class of compositions. On his return to Naples in 1785 he was appointed royal chapelmaster, and for many years remained in that city, writing an occasional opera for London and other cities. In 1799 he was national director of music under the republic, for which he remained several years in disgrace after the return of the royal family. In 1802 he went to Paris, to be chapelmaster to the first consul. In 1804 he was restored to his office of royal chapelmaster at Naples, in which he was retained by Joseph Bonaparte and Murat. Paisiello's works comprise 27 grand and 51 buffo operas, 8 interludes, and a vast collection of cantatas, oratorios, masses, and the ordinary forms of instrumental music. Some of his melodies, as "Hope told a flattering Tale," have had a wide popularity.

PAISLEY, a manufacturing town of Renfrewshire, Scotland, on both banks of the White Cart, about 3 m. above its junction with the Clyde, 8 m. W. by S. of Glasgow; pop. in 1871, 48,257. The navigation of the Cart to Paisley was improved in 1787, and vessels of 180 tons burden can now go up to the town. Its celebrated manufacture of the finest shawls was introduced about the beginning of the 19th century. Silk gauze, muslins, plaids, chenille, handkerchiefs, cotton, thread, carpets, soap, leather, and malt and distilled liquors, are manufactured; and there are brass foundries, boat-building yards, &c. The town owes its existence to the priory, founded about 1160, on the E. bank of the Cart, by Walter, high steward of Scotland. In 1219 the priory was raised to an abbacy by Pope Honorius III. With the growth of this establishment arose Paisley, which in 1488 was erected by James IV. into a free burgh of barony.

PAIXHANS, Henri Joseph, a French inventor, born in Metz, Jan. 22, 1783, died at his estate of Jouy-aux-Arches, near Metz, Aug. 19, 1854. He was educated at the polytechnic school, entered the artillery, and rose to the rank of general of division. He was a member of the chamber of deputies from 1830 to 1848, and was successively connected with the ministry of war, the committee on artillery, and several commissions of national defence. The guns and projectiles which bear his name were first employed in France in 1824. The guns, which were originally between 9 and 10 ft. long and weighed 75 cwt., were especially adapted for the projection of hollow cylindro-conical shot and shells. In connection with his inventions Gen. Paixhans made numerous useful suggestions to the French government respecting the armament of ships of war or fortresses for the defence of the seacoast. (See **ARTILLERY**, vol. i., p. 789.) He published *Considérations sur l'artillerie* (Paris, 1815); *Nouvelle force maritime* (1822), his most important work; and *Force et faiblesse de la France* (1830).

PAJOU, Augustin, a French sculptor, born in Paris, Sept. 19, 1730, died there, May 8, 1809.

He passed 12 years as a government pensioner at Rome, and returned to Paris in 1760. He executed more than 200 works in stone, metal, and wood, and for many years was professor of sculpture in the academy of fine arts.

PALACKY, Frantisek, a Bohemian historian, born in Moravia, June 14, 1798, died May 26, 1876. He was educated at Presburg and Vienna, and in 1827-'37 was editor of the *Casopis českého Museum*, the journal of the national museum at Prague. In 1829 he was appointed national historiographer, and commenced his "History of Bohemia" (vols. i.-v., 1836-'67), during the progress of which he published a "Theory of the Beautiful," a "History of Æsthetics," "Literary Journey to Italy in 1837," the *Archiv český* (5 vols., 1840-'66), "Oldest Memorials of the Bohemian Language," and other works. In 1848 he was president of the Slavic congress at Prague, and soon afterward was sent as representative to the Austrian parliament. Both in the Austrian house of lords, of which in 1861 he became a member for life, and in the provincial diet of Bohemia, he was for years the leader of the Czech national party. Having vainly opposed the reconstruction of Austria on a German-Hungarian basis to the detriment of the Czech nationality, he took part in 1867 in the Panславic gathering at Moscow. The most important of his later works is a collection of *Documenta* illustrative of the life and doctrine of Huss (1869).

PALEOLOGUS, the name of a Byzantine family, first mentioned in history in the 11th century, and which occupied the throne of Constantinople from 1261 to 1453, the year in which that city was taken by the Turks. The first emperor of the family was Michael VIII.; the last, Constantine XIII., was killed while fighting in defence of his capital. A member of this family, Theodore, a son of Andronicus II., received the principality of Montferrat in Italy in 1305, in right of his mother Yolante, and in the hands of this branch it remained till 1533. Another branch of the house reigned in the Morea from 1380 to 1460. The family is supposed to have become extinct with Theodore Paleologus, who died in England in 1693.

PALÆONTOLOGY (Gr. *παλαιός*, ancient, *ὄντα*, beings, and *λόγος*, discourse; *i. e.*, the study of ancient beings), the science which treats of the evidences of organic life upon the earth during the different past geological periods of its history. These evidences consist in the remains of plants and animals imbedded or otherwise preserved in the rocky strata or upon their surfaces, and in other indications of animal existence, such as trails, footprints, burrows, and coprolitic or other organic material found in the rocks. From very remote times men had observed these objects in the rocky strata, far above the level of the ocean. Pythagoras, Plato, Aristotle, Strabo, Seneca, and Pliny allude to the existence of marine shells at a distance from the sea; and by all the ancients their occurrence was connected with changes of the

earth's surface, and was considered conclusive evidence that the rocks containing them had been formerly submerged beneath the ocean. It was only in the beginning of the 16th century, when Christian nations turned their attention to geological phenomena, that fanciful opinions were promulgated, attributing these forms to "sports of nature," *lusus nature*, "the plastic force of nature," which effected these resemblances; or that, dating from the first creation, they were produced at the time of the formation of crystals or of the mountains themselves. More than a century was required to disprove this dogma; and an additional period of a century and a half was consumed in exploding the hypothesis that organized bodies had all been buried in the solid strata by Noah's flood. During this time, however, there were not wanting those who maintained more rational opinions. In the early part of the 16th century Leonardo da Vinci, having planned and superintended some canals in the north of Italy, opposed these views, asserting that the mud of rivers flowing into the sea had covered and penetrated into the interior of the shells when they were still beneath the water. Soon after this Fracastoro, on occasion of some excavations made about the city of Verona, declared his opinion that fossil shells had all belonged to living animals, which existed and multiplied in the positions where their remains are now found. In 1552 Cardan maintained that the former presence of the sea was clearly indicated by the petrified shells. In 1580 Palissy maintained the animal origin of fossil remains, and, as is said by Fontenelle, was the first who ventured to assert, in Paris, that fossil remains of testacea and fishes had once belonged to marine animals. In 1592 Fabio Colonna combated many of the erroneous theories of his day, and was the first to point out that some fossils had belonged to marine and some to terrestrial testacea. About the year 1597 Cæsalpinus maintained that fossil shells were those which had been left on land by the retiring waters of the sea, and had concreted into stone during the consolidation of the soil; and Majole, coinciding with these views, suggested that these shells with the materials containing them had been thrown up by volcanic action, similar to that which produced the Monte Nuovo, near Pozzuoli, in 1538. This appears to have been the first attempt to connect the occurrence of fossil shells at high elevations with volcanic agencies. These views were subsequently more fully developed by Hooke, Moro, and Hutton, the last two centuries after Majole. During these discussions in the 16th century large collections of fossil shells and other remains had been accumulated in private cabinets and public museums, notably in that of the Vatican in Rome, and that of the *museo calceolario* at Verona, which was perhaps the most famous of its time. Still the progress of scientific truth was slow. The first half of the

17th century passed away without any real advance in the views of men regarding the origin of fossils. There were many writers on the subject, who put forth the most absurd and fantastic hypotheses, all more or less yielding to the established prejudices of the period regarding the age of the world and the early conditions of things. In 1669, while it was still a prevailing opinion that fossil shells and other marine objects were not of animal origin, Steno, a Dane, previously a professor of anatomy at Padua, published his remarkable work *De Solido intra Solidum naturaliter contento*. In this he compared the shells discovered in Italian strata with their living representatives, and traced the gradations from shells which had only lost their animal gluten to those in which there had been an entire substitution of mineral matter. He demonstrated that the teeth and bones of a modern shark were identical in general character with remains found in Tuscany. He also distinguished between marine and fluviatile deposits, the latter containing remains of seeds, grasses, and trunks and leaves of trees. In 1670 Scilla, a Sicilian painter, published a treatise on the fossils of Calabria, illustrated by good engravings; but, like many eminent men of his time, he regarded all fossil shells as proofs of the Mosaic deluge. At the same period the theologians of Italy, Germany, France, and England maintained that it was an imputation upon the sacred writings to deny that fossil organic remains were proofs of the deluge. It will be seen that from the first the Italians have been preëminently investigators in geological science; and among those who in the 18th century advanced the most philosophical views regarding organic remains, and their origin and importance, may be named Vallisnieri in 1721, Spada in 1737, Moro in 1740, Generelli in 1749, and Donati in 1750. In 1754 Torrubia published a treatise on "The Natural History of Spain," in which is given an extensive list of localities of fossils in Great Britain and the continent of Europe, Siberia, China, the Molucca islands, and elsewhere. In 1758 the botanist Gesner of Zürich published a treatise "On Petrifications, and the Changes in the Earth which they testify." In the north of Europe the names of Bromel and Linnæus became associated with the study of fossil organic remains in the middle of the 18th century. In 1790 William Smith, civil engineer, published a "Tabular View of British Strata," tracing the continuity of the secondary formations over extensive areas, and recognizing them by their contained fossils. The value of the subject of fossil organic remains began now to be appreciated in France; and the names of Cuvier, Brongniart, Lamarck, and De France are associated with the scientific investigations in this department of knowledge in the early part of the 19th century. The studies of Cuvier in comparative osteology of the living and fossil vertebrates, of Lamarck and others in the mollusca,

of Alexandre Brongniart on fossil crustacea, and of Adolphe Brongniart on fossil botany, accomplished much for the advancement of palæontology, and aided greatly in giving it rank among the natural sciences. The names of Schlotheim, Wahlenberg, and others are connected with the investigations of organic remains in the early part of the 19th century; and from that time progress in the science has been so rapid, and authors so multiplied, that even the names cannot be enumerated in a sketch like this. Thus it is seen that only after long continued series of observations, carried on amid prejudices which blinded the judgment, men came finally to the conclusion that fossil organic bodies are representatives of the animals which inhabited the ocean bed at successive and remote intervals; and that they occur in the rocky strata precisely as they were imbedded in the mud or sand beneath the waters, or as they lived in the littoral belt along the shore line, where they were sometimes mingled with plants or animals of terrestrial origin.—It was, as we see by the history of scientific progress, a long and tedious process to prevail upon the human mind to dismiss the notion of the sudden creation of the earth and its inhabitants, and to recognize the creative energy extending through myriads of ages; to admit the fact that the dry land on which we stand was simply formed by the successive depositions of mud, sand, and gravel made upon the bottom or borders of the ocean, and that these were marked by the remains of those animals which lived at the time, as similar forms now live, in the oceanic waters; and finally, that these layers of rock, of whatever kind, mark certain eras, and contain an indelible record, more or less complete, of the conditions then existing, and of the changes which have brought about the later and present state of things. After much study and patient investigation the conclusion has been reached that, with very small exceptions, the dry land has resulted from the gradual uplifting of the ocean bed, carrying with it organic and inorganic material, in undisturbed or partially disturbed condition. An investigation of these materials, constituting the earth's crust, proves that organic life has been as effective in the earth's past as in its present conditions. It is the history, influence, and relations of this ancient organic world which constitute the science of palæontology in all its departments, and when fully understood will give us a better knowledge of the early conditions of the surface, the gradual progress through various phases, and the clear unbroken line from the earliest organisms to the advent of man upon our planet. The beginning, rise, and progress of the science of palæontology have been coincident with those of geology, since the latter was separated from the speculations of cosmogony, and became a science of observation and of legitimate induction. As geology was long regarded as a subordinate de-

partment of mineralogy, and sometimes of physical geography, so also it is only by slow steps that palæontology has assumed sufficient importance to be considered apart from its kindred science. The one characteristic feature in the rapid progress of geology during the present century has been the growing recognition of the importance of organic remains, and the increased attention and study given to this department of natural history. In all investigations among the stratified unmetamorphic rocks, this subject is of paramount importance; and even among the metamorphic rocks the aid of palæontology is sometimes of great advantage in our determinations. Zoölogy and botany have also partaken of this influence. Constant discoveries have created new demands upon the knowledge and acumen of the comparative zoölogist and botanist. The imperfect, fragmentary, or obscure condition of fossil remains has demanded the closest scrutiny of their external parts and of their most intimate structure; and it is to the reaction of this study of fossil organisms upon the methods of study in the living fauna and flora that we are indebted for a better knowledge of structure, and the filling up of gaps in our series; thus giving a truer arrangement and classification of existing forms by intercalating the fossil organisms in their proper relations.—The term "fossil" may be defined, according to M. Deshayes, as follows: "An organized fossil body is one which has been imbedded in the earth at an unknown epoch, which has been there preserved, or which has left there unequivocal traces of its existence." This excludes from the term the modern remains of plants and animals which have been buried and lost by the floods, land slides, or accidental causes of our times. This definition being adopted, it is easy to fix the limits of palæontology. In the present action of natural causes, we see analogies for the history of fossils imbedded in the strata of the globe. Streams, floods, and the action of waves bear along gravel, sand, or silt, and deposit them in quiet waters, the heavier materials first and underneath, the lighter above and more widely diffused, forming superimposed beds, all differing more or less in composition. A long continuation of this action may produce beds of great thickness, parallel in stratification, and in the course of their slow formation shells may gather and plants may grow, and gradually become buried by the new accession of drifting material. The first condition of these deposits is horizontality; subsequent disturbing forces may lift, or break, or disarrange them, and the gradual rising or sinking of certain portions of coast line or ocean bottom, as now taking place, must eventually produce such effects as here indicated. The study of the rocky strata shows that the same conditions, the same characters, the same accidents as these prevailed during their formation; and far from the necessity of supposing violent cataclysmic force, it is only necessary

to admit the carrying on of the same process, the operation of the same causes, possibly at some times more intensified, through indefinitely long periods, to produce in the greater number of instances the results which we see. The process of fossilization gradually supervening, with the induration of the entire enclosing mass of material, we have the beds of sand, clay, and calcareous mud converted into sandstone, shale, and limestone, still enclosing the same organisms as when they formed a part of the ocean bed; and it may be regarded as certain that these deposits were originally in horizontal or essentially horizontal position. Many of these fossil organisms were living in the condition, association, and arrangement in which we now find them. Others have been transported, broken, and mingled with those of the undisturbed beds. In some instances myriads of individuals of various forms have lived and died upon the sea bed, and have remained long undisturbed and not covered by sediments, since we find them sometimes supporting and enveloped by some other organism, as a coral, a bryozoan, or the roots of crinoidea. The physical nature and condition of the older metamorphic strata, in which we have no remains of animals (either they not then existing, or having been obliterated by physical and chemical changes), prove the conditions of sea and land to have been essentially the same then as at present. The great extent of ancient limestone formations renders it probable that the ocean of that period was inhabited, although of the inhabitants there is no trace. From the period of the Potsdam sandstone in America and the Cambrian rocks of Europe, we find the remains of numerous forms of animal and vegetable life. We see traces of the conditions under which they lived; the sands of the sea beaches, laid bare by the ebbing tide, were rippled by the wind and trailed by the animals of that primeval ocean. From that period at least, light and heat, cloud and sunshine, rain and wind refreshed and fertilized the earth, which teemed with animal and vegetable existences. The testimony of living things is found in their fossil imprints, the earliest evidences of life in the remains of plants and animals imbedded in the ancient sea bottoms or stranded upon the shores. Through unnumbered ages life has presented its varied forms without cessation from its first appearance on the globe; each successive epoch, each new physical condition, whether of ocean bed or shore, of moist or of dry land, presenting its new and peculiar fauna or flora. In the course of these incalculable periods the aspect and character of the existences have changed, and there has been, if not a regular progression, yet in the main a wonderful advance over the earlier organisms. The relations of these fossiliferous beds one to another have led to the recognition of geological periods; and these periods are verified over wide areas of country, continuously or interruptedly, even to the extent of the

two hemispheres. It is from the occurrence of certain peculiar forms, or an assemblage of them, in these strata, that the period or geological age can be determined.—A remarkable feature which strikes the observer is the great number of types that have appeared in a limited geological period. Trilobites, for example, lived in epochs of limited range; also the great reptiles, the pterodactyls, and certain forms of fishes, as well as some of the lower organisms. Many of these are so peculiar that their appearance or disappearance is at once noticed. They are wanting in the most ancient epochs; afterward they are developed in abundance, and more or less gradually disappear, leaving no trace in subsequent periods. This is equally true of all the other forms; and scarcely any extend over more than a small number of geological periods. In the most ancient epochs the greater number of forms have not existed; there we would search in vain for fishes, reptiles, birds, and mammals. All our fossil fishes belong to geological formations relatively recent. In the mollusks, the articulates, and the radiates, the greater number of species appear after the ancient epochs, and successively in each of the subsequent ones; while a few types, beginning in the earlier geological periods, have been continued to the recent, or even to present times. This is notably true of the linguloid type, although not of the true *lingula*. Other species have had a brief existence. Created early, they disappear before the recent epochs, and in the fact of their early appearance, as a rule, is the certainty of their prompt disappearance. Some forms which lived in the intermediate epochs are completely wanting in the older and in the newer formations. In regard to the number of fossil genera which have had a limited duration, M. d'Orbigny enumerated, from about 1,600 then known, only about 16 which occur in all the periods; and while the whole number of genera has been since that time greatly augmented by new discoveries, a critical study will probably prove that fewer than 16 are common throughout the whole. It sometimes happens that one or more species may appear at an earlier epoch, rare or common, but usually restricted to a limited area, and, having disappeared for an interval of one or two epochs, may reappear in greater numbers and over a far wider extent, and in association with an entirely different fauna from the first; but such cases are exceptions. M. Barrande has designated species in this mode of occurrence as colonies, and has shown that colonies are of common occurrence in the palæozoic rocks of Bohemia. As a rule, the extinction of a fauna at the close of any geological epoch depends upon the degree of change in the sediments. Where the change is abrupt, the fauna is more likely to be entirely cut off; while if the change be in less degree, some of the species may survive. Again, where the fauna is apparently destroyed from a change in the character of the sedi-

ments, continued perhaps for a considerable time, yet on a recurrence of the former physical conditions some of the species of the preceding epoch do reappear. So dependent upon and connected with the surrounding physical influences is the fauna, that sometimes, after a considerable interval of change, and the existence of an entirely different fauna, a recurrence of former conditions, though not bringing back the same species, will bring a group of similar forms and of the same genera, and sometimes species scarcely distinguishable from those of the preëxisting fauna.—Since all observation has proved that no species continues through all the geological eras, and few if any are found in more than two periods, we are warranted in inferring a law of limited duration in time for each species. The effects of this law may appear, in the general results, in two ways: either that each species is altogether independent of others in its appearance and disappearance, or that those species appearing together for the first time have also disappeared together. In the first case there would be a continued series of modifications in animal populations, and consequently an impossibility of finding in the zoölogical characters any defined limits for geological periods. In the second case there would be strong lines of demarcation between the disappearance of species and the appearance of those which replace them. In order to decide among the geological faunas whether the rule is the independence of the species or the combination of the above two conditions, and taking into consideration only those faunas living in the same or proximate localities, it would be inferred that the phenomena which can produce a renewal of the zoölogical population must extend their action to almost the totality of species. The principal proofs of this conclusion are to be found in the observation of geological facts. Individual species nevertheless do die out without geological changes, but of themselves in the midst of conditions in which they lived and flourished. If in fossiliferous deposits we observe the line of contact of beds, it will be found that the fossil forms are nearly always very restricted. Sometimes a formation characterized by its fossils succeeds without gradation to another not less distinct in its fossil characters. Sometimes a non-fossiliferous bed occurs between two fossiliferous formations; but rarely do we find a deposit containing in their normal condition the fossils of the bed below it, mingled with those of the bed by which it is succeeded. We shall usually find that where there is a mingling of the species of two formations, this single member containing them is the representative of two distinct beds in some other part of the geological field, and combines in some degree the physical characters of both. In some cases this fact may perhaps be explained by admitting that the cause of extinction has operated generally upon the fauna, but that this

action has been locally circumscribed, while the two faunas continued their existence in distant localities, beyond the reach of this influence. The question of the duration of species has divided naturalists into two parties. Those who maintain their limited duration hold that the extinction of all contemporaneous faunas took place simultaneously over the whole extent of their geographical distribution; that the species of each geological period have lived only in that period; and that no one species can be found in formations of different ages. They hold that species so occurring which have been considered identical must be in reality distinct. The solution of this question is of very great palæontological interest. If fossils are special to the formations, they characterize them with a complete certainty. If some are special and some are common to several formations, a part only can furnish conclusions, and hence a source of uncertainty and chances of error. The united experience of observers goes to prove that some species are restricted to certain formations, and are therefore characteristic of those formations, while others have a wider geological range, and cannot be wholly relied on for the determination of age among the strata; and in the study of a group of fossils, no careful naturalist will do otherwise than base his conclusions accordingly. It is nevertheless true that sometimes, from erroneous determinations, the same fossil species have been catalogued as from different formations; and there has also been a want of unity of opinion among geologists in regard to the limits of formations, while in disturbed regions it may not have been possible to define the limits, and thus the collections show an admixture of fossils which are elsewhere known to belong to different formations. Established facts in palæontology prove that the limited duration of species is the general rule; but at the same time the rule has exceptions. 1. Some species, being more robust, more prolific, or living under more favorable circumstances, may have resisted causes of destruction which prevailed over their associates. 2. The causes of extinction have rarely operated uniformly or with the same force over the entire geographical extent of the fauna of any period. Examples might be cited where the coming in of 1,000 or 2,000 ft. of sediment destroyed the previous fauna over many hundreds of miles in extent; and yet beyond the thinning margin of this deposit remains of the preceding fauna are found in contact with the overlying formation, and the fossils of the two eras are mingled, although apparently not having lived at the same time. We infer, therefore, that upon the extreme limits of the disturbed areas there may have been basins where some of the animals escaped, and thus afterward mingled with the new population. In general such basins, being beyond the geological movement, are marked by the small accumulation of sediments and

thinner beds. M. d'Archiac and M. de Verneuil have observed that the persistence of species is connected or corresponds with the extent of their geographical distribution. "The species which are found at the same time in many points and in far separated countries are almost always those which have lived during the formation of several successive epochs." ("Transactions of the Geological Society," 2d series, vol. vi., p. 335.) This may be regarded as true in general, and for the same reason they may have continued their existence; but we have an exception worthy of note in the brachiopodous genus *tropidoleptus*, which first appears in the Hamilton group, and occurs in this group from near the Hudson to beyond the Mississippi, and is found likewise in Europe, while neither the genus nor any form of the type is known in any later formation. With a few individual exceptions, the differences which exist between the lost or fossil faunas and the existing animals are the greater according as the former are more ancient. The recent forms are more varied; the diversity of animal organization has augmented in the lapse of time. But this does not warrant the inference that because the most ancient faunas are composed of animals of lower organization, the degree of perfection, as a rule, increases as we approach the more recent epochs. We find the more and the less perfect, or the lower and the more highly organized, living contemporaneously in the later geological periods, and each epoch presenting a fauna and a flora adapted to the existing physical conditions. The order of appearance of different types has been shown to represent the phases of embryonic development. The comparison of faunas of different epochs shows that the temperature has varied upon the surface of the globe, and that the areas of varying temperature have not corresponded with the present, but have resulted from physical causes existing at the time, producing wider areas of uniform conditions; and to this cause may be attributed the fact that the species of the ancient formations have had a wider geographical distribution than those of the present time. In conclusion we find that fossil animals were constructed upon the same plan as the existing animals; and that the same zoological principles are applicable in their study and classification.

CLASSIFICATION OF THE ANIMAL KINGDOM.

INVERTEBRATA.

Subkingdom PROTOZOA—Class RHIZOPODA (*amorphozoa*).

Order SPONGIDÆ.

Of fossil sponges, *palæospongia* and *acanthospongia* and other forms occur in the Cambrian; and *astylispongia*, *astræospongia*, *palæomanon*, &c., in the Silurian. *Stromatopora*, which is placed in this class by some naturalists, occurs abundantly at the base of the Trenton, and in the Niagara group; and near the base of the lower Helderberg it forms a stratum four feet thick and extending over many miles. It is likewise abundant in the upper Helderberg and in the calcareous portion of the Chemung group. It is abundant in the Wenlock limestone of England. Other genera of sponges occur in carboniferous, Permian, triassic, Jurassic, cretaceous, and tertiary strata.

Order FORAMINIFERA.

Organisms of this order are usually minute or microscopic. Some forms are known in the Cambrian and Silurian rocks of Europe. Ehrenberg has described species of *testularia*, *rotalia*, and *guttulina* from the greensands of the obolus or unguite grits of Russia, which probably hold the same position as our Potsdam sandstone. In the carboniferous limestones of Ohio, Indiana, Illinois, Iowa, Missouri, and Kansas, *rotalia*, *fusulina*, &c., are abundant, and probably other genera. The last named fossil forms layers of considerable thickness, known as fusulina limestone. The foraminifera are abundant in the Jurassic period, but acquire their greatest development in the latter part of the cretaceous and eocene tertiary, in the *nummulites*, *orbiculoides*, *orbiculina*, &c. The nummulitic limestones are found in France and southern Europe, northern Africa, and India, in the United States, and in the island of Jamaica. The most common form is seen in the limestone of the great pyramids of Egypt. *Receptaculites*, which is regarded by some naturalists as a gigantic foraminifer, is known in the Trenton group, and is abundant in the upper member of the formation, one species being a foot in diameter. It occurs also in the Niagara, lower Helderberg, and upper Helderberg formations. The *cozoon* of the Laurentian has been referred to this order.

Subkingdom COELENTERATA (radiates, polypi).

Class HYDROZEA. Graptolitidæ.

The graptolites are characteristic Cambrian and lower Silurian fossils, and most abundant on the confines of these two systems. Species of the several graptolitic genera range from the Potsdam sandstone to the Clinton group inclusive. *Dictyonema*, a graptolitic genus, is known from the base of the Trenton to the Hamilton group, or middle Devonian. *Oldhamia*, the oldest known fossil of the European Cambrian, is probably a graptolitic genus.

Class ACTINOZOA (corals, madrepores).

Of corals, the cyathophylloid type (order *zoantharia rugosa*) begin their existence in the Cambrian, and are known from the base of the Trenton group, through all the formations, to the close of the palæozoic era, acquiring their greatest development in the Devonian (coniferous and Hamilton). Corals of the same form, with different internal structure, known as the order *zoantharia aporosa*, characterize the formations from the trias to the present time. The latter are known as the neozoic, and the former as the palæozoic type. Corals of the madreporic tribe (*zoantharia tubulata*), as *colummaria*, *favistella*, *favosites*, &c., begin their existence about the same time as those of the cyathophylloid type, acquiring their greatest development in the Devonian, and disappearing at the end of the carboniferous period.

Class ECHINODERMATA.

1. *Crinoidea* (encrinites, stone lilies).
2. *Cystidea* (cystideans).
3. *Elastoidea* (pentremites).
4. *Asteriada* (sea stars, star fish).
5. *Ophiurida* (sand stars, serpent stars).
6. *Echinida* and *palechinida* (sea urchins).
7. *Holothurida* (sea cucumbers).

The encrinites are the earliest type of this class, and appear in the Cambrian system of Europe, and in rocks of the same age in America. The fossils of this family first become numerous in the Trenton period, and are abundant in the Niagara and lower Helderberg. They are usually not abundant in the Devonian, though the Hamilton group has yielded a considerable number of species; but they become extremely abundant in the carboniferous, with the most extravagant forms in the lias, and from that time decline to the present epoch. The cystideans begin their existence at the same time as the encrinites, and are common in the Trenton and Niagara periods, gradually disappearing with the close of the Silurian age. The pentremites proper are of rare occurrence in the Silurian period, but become common in the Devonian, and reach their greatest development in the carboniferous, where they disappear. The star fishes are first known in the Trenton period, and continue with increasing numbers through the Devonian and carboniferous epoch, and they occur in varied forms through the Jurassic, cretaceous, and tertiary, to the present time. The ophiuroids (sand stars or serpent stars) begin their existence in the lower Silurian, and extend through the Devonian and carboniferous. They are unknown in the Permian and triassic, but occur in the Jurassic, cretaceous, and tertiary, and are more numerous in the modern seas. The echinoids, of the type of *palechinus* or *eo cidaris*, commence in the Devonian period and continue through the carboniferous. The true *echinida* and *cidarida* begin in the

lias and continue to the present time. The holothurians, which are soft, cylindrical bodies, are found in the lias, being recognized from certain minute calcareous parts known to belong to this order of echinoderms.

Subkingdom MOLLUSCA.

Class LAMELLIBRANCHIATA (*conchifera*, bivalve shells). The fossils of this class of shells first appear, as representatives of the families *nuclidæ* and *arcadæ*, in the Cambrian period, and are known in the Quebec group and Trenton limestone, in the genera *tellinomya*, *nuclites*, and *palæarca*; and the *aviculidæ* and *mytilidæ* are represented in the Trenton period. They gradually increase in numbers through the Silurian strata, until in the Devonian (the Hamilton and Chemung groups) these fossils, in the genera *aviculopecten*, *pterinea*, *nuclia*, *nuclites*, *grammysia*, &c., are sometimes more numerous than the *brachiopoda*. In later times the shells of this class acquire a much greater importance, and largely preponderate over the *brachiopoda*.

Class GASTEROPODA (univalve shells). The fossils of this class began their existence in the earliest geological periods, and we recognize them in the Potsdam sandstone of America and the Cambrian of Europe. The earlier forms belong to the families *turbinidæ*, *haliotidæ*, *calyptræidæ*, *bellerophonitidæ*, *atlantidæ*, &c. *Maclurea*, *ophileta*, and *euomphalus* occur in the calciferous sandstone.

Class PTEROPODA. The fossils of this class commence in the lowest fossiliferous strata. The genus *thea* occurs in the Potsdam sandstone. *Pterotheca* and *conularia* are found in the Trenton limestone, and the latter continues through the Silurian, Devonian, and carboniferous periods.

Class CEPHALOPODA. The fossils of this class have existed in all geological ages, and appear in varied and conspicuous forms. The oldest known in the Cambrian system are *orthoceratites*, of which we have great numbers in the Black river and Trenton limestones. Associated with these are *lituites* and *cyrtoceras*, which continue to the Devonian period. The genus *goniatites* begins in the Devonian and continues through the carboniferous. In the triassic begin the genera *ceratites* and *ammonites*; the latter appear in great numbers and variety of form in the Jurassic period, and still continue, together with *scaphites*, *turritites*, and *baclutites*, in the cretaceous system, beyond which these forms do not occur. The genus *nautilus* appears in the Silurian, and continues through all the geological periods to the present time.

Subkingdom MOLLUSCOIDEA.

Class POLYZOA or BRYOZOA. These are bodies consisting mainly of branching or reticulated calcareous fronds, rising from a root, or of expansions adhering to other bodies, minutely cellular. The most common paleozoic forms are *fenestella*, *retepora*, *polypora*, &c. In America these fossils reach their maximum development in the carboniferous period, where the spreading fronds are sustained by a strong central axis, upon which they grow in a spiral arrangement, as in the genus *Archimedes*.

Class BRACHIOPODA.* The fossils of this class are everywhere abundant, and are the best guides in the study of the strata throughout the paleozoic period. The linguloid type, in the genera *lingulella* and *lingulepis*, begins in the lowest known fossiliferous formation, and continues through every geological epoch to the present time. The genus *obolus* characterizes the oldest Cambrian beds of Europe and the Potsdam of America. The *orthidæ*, in the genera *orthis* and *orthisina*, begin in the Cambrian, become more abundant in the Silurian, and, gradually lessening, die out at the end of the carboniferous period. The same is true of the *strophomenidæ*, represented in the genera *strophomena*, *leptæna*, *strophodonta*, and *streptorhynchius*. The *rhynchonellidæ* begin in the Chazy limestone, and continue throughout all the geological periods. They are especially abundant in the upper Silurian, Devonian, and carboniferous periods. The *spiriferidæ*, in *zygospiria*, begin in the Trenton formation, and characterize the Clinton and Niagara groups in the genera *spirifera*, *cyrtia*, *cyrtæna*, and *meristella*. The genus *athyris* begins in the Devonian, and the family dies out in the genus *spiriferina* in the Jurassic period. The pentameroid forms begin in the Trenton and disappear in the Devonian. The family *productidæ* appears in the genus *chonetes* at the period of the Clinton group, and continues through the carboniferous. *Productus* (*productella*) begins in the upper Helderberg, continues through the carboniferous, and disap-

pears in the Permian. The *discinidæ*, in the genera *discina*, *trematis*, &c., begin their existence in the Trenton and Hudson river periods, and are represented by *discina*, *orbiculoidea*, and allied forms, through the Devonian and carboniferous periods, and to the end of the geological series. In like manner the *craniadæ* begin as low as the Trenton and extend through the entire series. The *terebratulidæ* are first represented in the upper Silurian of the lower Helderberg, and are thence known in the genera *cryptonella*, *centronella*, *terebratula*, *terebratella*, *Waldheimia*, &c., to the end of the series.

Class TUNICATA (*ascidea*). The forms of this class have no solid shell, the soft parts being protected by an elastic gelatinous covering having two orifices. The soft character of these organisms precludes their preservation in the rocky strata.

Subkingdom ANNULOSA (*articulata*).

Class ANNELIDA. The tracks of animals of this class (or perhaps of crustaceans) are found in the Potsdam sandstone of America, and in the Cambrian rocks of Europe. The order *tubicolæ* is represented in the lower strata by serpuloid forms. *Arenicolites*, or worm burrows, are common in the oldest fossiliferous rocks; so that this class of organisms has existed from the most ancient times.

Class CRUSTACEA. The *entomostraca* in the order *trilobita* is represented in numerous genera, beginning in the lower Cambrian rocks, extending through the Silurian and Devonian; gradually lessening in the latter, and dying out entirely in the carboniferous period. The order *merostomata*, represented in the genera *eurypterus*, *pterygotus*, *stimonia*, *dolichopterus*, *stylonema*, and *arthroleptera*, begin their existence in the middle Silurian, and extend in some variety of form to the close of the coal measures. The *phyllopora* commence near the base of the Silurian proper, and appear in the paleozoic rocks in the genera *ceraticaris*, *dithyrocaris*, and others. The *ostracoda* or *cyproidea*, in the form of small bivalved crustaceans of the genera *primitia*, *leperditia*, *cytherina*, *Beyrichia*, *bolbozoa*, *aristozoa*, &c., occur in the lowest fossiliferous rocks, and continue through the paleozoic age; these are followed in later periods by *cythera*, *cypris*, *cyrella*, *cypridella*, &c. The *podophthalmia* or *decapoda*, including the crabs, lobsters, and their allies, commence their existence after the paleozoic era, and continue through all the formations to the present time. The *cirripedia* begin as low as the Trenton limestone, in the form of *plumulites* or *turritelpas*; continuing but sparsely below the carboniferous, where they become more common, and increase in number of forms through the succeeding epochs to the present.

Class ARACHNIDA. Fossil spiders are found in the carboniferous strata, in the Solenhofen slates of the Jurassic, and in the tertiary.

Class MYRIAPODA. Centipedes and millipedes begin their existence in the carboniferous period.

Class INSECTA. Fossil remains of insects have been found in the lower coal measures and in the Devonian, and more abundantly in the lias limestone of Europe. In some portions of the tertiary formation of the western territories their remains are abundant, and also in the tertiary of Europe.

VERTEBRATA.

Class PISCES (fishes). The ganoids, an order covered with bony plates, like the garpike and sturgeon, are among the earliest known forms of fishes. The genera *coccosteus*, *ptericthys*, *onychodus*, *macropetalichthys*, &c., occur in the upper Helderberg, lower Devonian, and subsequent formations. The genera *cephalaspis* and *holoptichius* are known in the old red sandstone of Europe, and the remains of the latter genus abound in the Catskill formation of New York and Pennsylvania. The genera *eurylepis*, *celacanthus*, and others are known in the coal measures of Ohio. Of the selachians, or fishes with cartilaginous skeletons, the cestracodonts begin their existence in the age of the upper Helderberg, and continue through all the formations to the present time. The hyodonts first appear in the lower carboniferous, and continue through succeeding formations. The *rauidæ* (rays) begin their existence in the carboniferous, and are known in the lias and eocene formations, and in the present fauna. The squalodonts, or true sharks, first appear in the cretaceous period, and continue to the present time. The *teleostei*, or bony fishes, such as perch, cod, salmon, &c., commenced in the trias. Some forms occur in the middle and upper Jurassic, but are not common below the cretaceous period. No fossil fishes are known in the Silurian of America; and it may be considered doubtful if the European species cited as Silurian are really older than our own.

Class AMPHIBIA (batrachians). The order *labyrinthodonta* is represented in the carboniferous period of Europe and America. The *apateon* and *archegosaurus* are European

* The *brachiopoda* are placed in this connection without expressing any opinion regarding their relations. That they are not true *mollusca* seems very clear from the condition of the fossil forms, the structure of the shell, and the character of the muscular and vascular impressions, as well as other reasons; but it may be premature to insist on their arrangement with the *annulosa*.

forms; *amphibamus*, *raniceps*, *dendroterpeton*, *hylonomus*, *baphetes*, and *sauropus* are found in the coal measures of Nova Scotia and the United States. Footprints of labyrinthodonts are found in the coal measures of Pennsylvania, Illinois, Indiana, and Kansas. The genus *lepidosaurus* is known in two species in the Permian of Europe. The *labyrinthodon* (*cheirotherium*), *anisopus*, *otozoum*, *macropteria*, *teleterpeton*, and other amphibians occur in the trias.

Class REPTILIA. The order *lacertia* is represented in the Permian by the genera *protosaurus*, *paleosaurus*, *deuterosaurus*, and *theodontosaurus*; the last is one of the most highly organized forms of the order. The genera *rhynchosaurus*, *clepsysaurus*, *belodon*, *phytosaurus*, *rhabdopelia*, and others, are characteristic of the trias of Europe and America. Other genera are known in the Jurassic and cretaceous, and in the present period. The genus *mosasaurus*, beginning in the cretaceous, is most conspicuous among the saurians of that period, occurring in numerous localities and in many species. Of the order *crocodilia*, the genera *telesaurus*, *hyposaurus*, *thoracosaurus*, *holops*, and *mystriosaurus* are examples. The order begins in the trias, and continues to the present time, the true crocodiles occurring in the tertiary. The order *pterosauria* (flying saurians) are represented by the genera *ptero-dactylus*, *rhamphorhynchus*, and *ornithopterus*, beginning in the lias and disappearing with the cretaceous. The order *dinosauria*, represented by the genera *iguanodon*, *megalosaurus*, *anomalopus*, *bathynaghus* (an amphibian?), *hadrosaurus*, *hylaosaurus*, and others, begin their existence in the trias, and continue to the base of the cretaceous period in Europe and America. The order *dicynodontia* is a remarkable group of saurians, represented by *dicynodon*, *ouedenodon*, and others, in supposed triassic rocks of south Africa and Bengal. The enaliosaurians (sea lizards), including *plesiosauro* and *ichthyosaurus*, began their existence in the trias, disappearing with the cretaceous. The genera *notiosaurus*, *limosaurus*, and *sphenosaurus* are among the triassic forms; and *ichthyosaurus* and *plesiosauro* are characteristic liassic forms, occurring also in cretaceous. To the same order belong the *disco-saurus* and *polycoetes* of the American cretaceous. The *ophidia* (serpents) make their first appearance in the eocene tertiary, and continue in all the more modern epochs. The genus *paleophis* is characteristic of European and American tertiary; and *litophis*, *limnophis*, and *dinophis* have been described from American tertiary. The *chelonia* (turtles, tortoises) begin their existence in the middle of the Jurassic period, and continue to the present time. The earliest forms were of marine habitat, but at later periods we find freshwater and land forms. The *trotostrernum* is the earliest well established genus. A monstrous form, *atlantochelys*, and other large and small turtles, occur in the cretaceous of Kansas. The genera *trionyx*, *emys*, *compremys*, *colosochelys*, and others occur in the tertiary.

Class AVES. The existence of birds has been inferred from the occurrence of three-toed tracks in the sandstone of the Connecticut valley of the age of the trias (?). A remarkable genus of birds, the *archaeopteryx*, has been found in the Jurassic slates of Solenhofen. The genera *termatornis*, *paleotringa*, *laornis*, *ichthyornis*, *apatornis*, and others, have been described from the cretaceous. Fossil birds occur in the Wealden of Europe, and numerous genera and species in the tertiary of Europe and America. The miocene beds of France afford more than 70 species.

Class MAMMALIA. The *marsupialia* were the first in geological order among the mammalia, the genus *microlestes* occurring in the upper trias of Germany and England. The *dromatherium sylvestre* of Emmons is a small marsupial animal from the trias of North Carolina. The *spalacotherium*, *amphitherium*, and *phasecolotherium* have been found in beds of the Jurassic age; while other forms are known in the tertiary. The *cetacea* appear in the American eocene period in the gigantic genus *zeuglodon*. Other forms occur in the miocene of the Atlantic coast; and the skeleton of a small whale, *beluga*, has been found in the post-pliocene of the Champlain valley. Of the order *ungulata*, the *palaotherium*, *anaploterium* (*xiphodon*), and *lophiodon* were the earliest representatives in the eocene of Europe; and in the same formation in America, we have the genera *hyrachys* and *paleosyops*, belonging to the same group as the preceding; the *antatherium* and *dinoceras*, which belong to the *rhinocerata*; and the *orokhippus* of the *equidae*. In the miocene we have the genera *anchitherium*, *hipparion*, *tilanotherium*, *rhinoceras*, *oreodon*, *brontotherium*, and others. The horse, camel, llama, deer, musk ox, hog, tapir, hippopotamus, and other forms are represented in that epoch, and are continued to the present time. The genus *bos* occurs only in the latest tertiary or quaternary. Of the *proboscidea*, we have the *dinotherium*, *mastodon*,

and *elephas* in the upper miocene; but the elephant and mastodon are more characteristic of the pliocene and later formations. The *carnivora* begin their existence in the tertiary. Among the earliest forms are *arctocyon* and *palaocyon* in the eocene; the genera *hyaenodon*, *macharodus*, *felis*, *canis*, *cynodon*, *amphicyon*, *ursus*, *hyaena*, and others, occur in the later epochs of the system. Of the *rodentia*, the genera *arctomys*, *lepus*, *mus*, *castor*, *arvicola*, *lagomys*, and others, occur in the later tertiary. The *cheiroptera*, or bat-like animals, begin their existence in the later tertiary; as also the *insectivora* proper, none of them appearing before the later miocene.

—The following synopsis of the classification of plants will serve for general reference in palæontology:

CRYPTOGAMOUS OR FLOWERLESS PLANTS.

Class I. ANOPHYTES, and II. THALLOPHYTES or cellular cryptogams.

Musci, *hepaticæ*, *lichens*, *fungi*, *algæ*, *desmidiæ*, &c.

Class III. ACROGENS, or vascular cryptogams.

Equisetaceæ, *filices*, *lycopodiaceæ*, *hydropteridæ*.

PHENOGAMOUS OR FLOWERING PLANTS.

Class IV. ENDOGENS or MONOCOTYLEDONS.

The orders of this class include the *cyperaceæ* (sedge), *gramineæ* (grasses), *juncaceæ* (bulrushes), *liliaceæ* (lilies), *typhaceæ* (cattail), *palmaceæ* (palms), and many others.

Class V. EXOGENS or DICOTYLEDONS.

Under the subclass of angiospermous plants (seeds in a pericarp) are included more than 100 orders, which embrace all the ordinary forest trees except the *conifera*, besides far the greater proportion of flowering plants. Under the subclass of gymnosperms (seeds naked) are included all the *conifera*.

Until near the end of the Silurian period, the only remains of plants are of marine origin, such as *algæ* or *fucaceæ*; while some of the forms classed as plants may be really sponges. The earliest evidence of dry-land vegetation began with those conditions which ushered in the Devonian epoch; for the general character of the flora in the Devonian of America, so far as known, remains essentially the same throughout the carboniferous period. Here we have land plants of acrogenous forms, such as ferns in great abundance; the *equisetaceæ* in the calamites; the *lycopodiaceæ* in the lycopodites, *lepidodendron*, &c.; while *psaronius*, *stigmaria*, *sigillaria*, and others constitute orders allied to those mentioned. During this period the phenogamous plants are comparatively rare, and these are of the *conifera*. The condition of the surface favored only the development of the lower orders of vegetation; and we know that the low land of this period was subject to the influx of the ocean, probably from oscillations of the continental land, giving alternate strata of land deposits with land plants, and marine calcareous strata with shells and marine remains alone. The great amount of land vegetation at this period does not indicate that the entire surface of the present continent was then dry land, and that plants everywhere abounded at the same time and are imbedded in strata of this age. On the contrary, at the west and southwest, land plants are extremely rare, or altogether wanting in rocks of this period; while strata of marine origin with marine animal remains hold the same position. At each successive geological period the flora appears to have approached more nearly that of the present; not however

in the same latitudes, for the older floras of the temperate zones exhibit in many respects a tropical aspect. In the cretaceous and tertiary periods, the flora embraces many genera of the existing flora of the temperate zones. In the successive faunas also, even of the ocean bed, we are to take into consideration the existing physical conditions. In the very early periods coarse and fine sediments are found, indicating, if not shore lines, at least shallow and disturbed water on one side, and deeper seas with quiet water and finer sediments on the other. The geographical extension of species does not always correspond with the nature of the sediments; for while in the Trenton period we have a large number of *brachiopoda* extending over wide areas, even as far west as the formation is known, the same is not true of the Ham-

ilton group, although the physical characters of the two formations appear to have been equally uniform. This fact, however, does not furnish an argument in favor of gradual climatic or other permanent changes; for again in the carboniferous period certain forms of *brachiopoda* have even a wider range than in any preceding period.—The causes affecting the distribution of the faunas and floras of the several geological periods cannot be discussed in a sketch like the present; but that these have successively appeared and disappeared is ascertained in every part of the habitable globe. Of the succession or coming in of new species we have everywhere abundant evidence; and in a great proportion of instances they could not have been derived from sources very far from where we find their imbedded exuviae.

TABULAR ARRANGEMENT OF THE GEOLOGICAL FORMATIONS, WITH THE NAMES OF SOME OF THE CHARACTERISTIC ORGANIC REMAINS.

MODERN OR QUATERNARY.	GENOZOIC OR TERTIARY.	TERTIARY.	Post-tertiary. Recent and post-pliocene.	Alluvial deposits, peat, calcareous tufa, glacial and modified gravel, with remains of man; associated plants together with extinct fossil mammalia— <i>elephas</i> , <i>mastodon</i> , <i>megatherium</i> , <i>mylodon</i> , <i>glyptodon</i> , &c.; with shells, &c.
			Pliocene.	Mostly marine shells, bivalves and univalves in great numbers, and largely of living forms. The fossil flora indicating a warmer climate than the present.
MESOZOIC OR SECONDARY.	CRETACEOUS.	TERTIARY.	Miocene.	The upper part with some extinct mammalian remains, <i>elephas</i> , <i>mastodon</i> , <i>siatherium</i> , <i>hexaprotodon</i> . The fossil flora contains species of <i>acer</i> , <i>platanus</i> , <i>smilax</i> , &c. The marine fauna with a mixture of extinct and existing species (India). The lower miocene has a greater proportion of extinct forms, and is remarkable for its great number of extinct mammalian remains, especially in the western part of this continent, among which are <i>rhinoceros</i> , <i>oreodon</i> , <i>brontotherium</i> , <i>titanotherium</i> , <i>palæotherium</i> , <i>anchitherium</i> , <i>archæotherium</i> , <i>machærodus</i> , &c.
			Eocene.	In the upper part, land and fresh-water shells, with mammalian remains; marine shells, corals, foraminifera. Many remains of sharks of enormous size. Cetaceans (whales, <i>zeuglodon</i> , &c.), herbivores, carnivores, ruminants, pachyderms, monkeys, &c., first appear.
			Upper cretaceous (Maestricht chalk, white chalk, and chalk marl).	Characterized by remarkable forms of saurians of several genera, <i>mosasaurus</i> , &c., chambered shells (<i>ammonites</i>), univalve and bivalve shells, echinoderms, and corals; brachiopoda, mostly <i>rhynchonellidæ</i> and <i>terebatulidæ</i> ; and the remarkable family <i>rudistæ</i> ; and in America by a fossil flora analogous to the tertiary and recent forms, as maple, willow, beech, poplar, elm, sassafras, &c.
	JURASSIC.		Lower cretaceous or Neocomian (Wealden).	Many cephalopods, including ammonitoid shells in a great variety of forms, with many peculiar forms of bivalve mollusca, as well as the ordinary forms. Fishes allied to the garpike. A remarkable fresh-water saurian (<i>iguanodon</i>). The flora is characterized by a great number of <i>coniferæ</i> , <i>cycadææ</i> , and ferns. First appearance of deciduous trees. Bony fishes (teleosts) become common; crocodiles and cetaceans (whales).
			<i>Oölite</i> . Upper. Middle. Lower.	Marsupial and insectivorous mammalia— <i>amphitherium</i> , <i>phascolotherium</i> . A remarkable form of bird, <i>archæopteryx</i> . Flying reptiles (pterodactyls). Large numbers of fishes, insects, crustaceans resembling the common crawfish, chambered shells (<i>ammonites</i> , <i>belemnites</i> , &c.), univalve and bivalve shells. Brachiopoda, echinidæ, crinoidea, corals, &c. Among the fossil plants the <i>cycadææ</i> predominate (<i>samia</i> being the prevailing genus), with <i>coniferæ</i> and ferns.
	TRIASSIC.		<i>Lias</i> . <i>Lias</i> (limestones and slates).	The lower (liassic) beds are characterized by remains of gigantic saurians, <i>ichthyosaurus</i> , <i>pterosaurus</i> , &c.; fishes of the shark family and others; insects, with mollusks of the several orders, and extravagant forms of crinoidea, &c.
			Upper, middle, and lower trias. Red sandstones of Connecticut valley. Shales, sandstones, and beds of bituminous coal.	Mollusca numerous; the cephalopods chiefly of the genera <i>ceratites</i> , <i>ammonites</i> , and <i>orthoceras</i> , the latter genus becoming extinct in this formation. Last appearance of the brachiopodous family <i>spiriferidæ</i> . One form of encrinite abundant. Fish teeth and saurian remains. A remarkable batrachian form, the <i>labryrithodon</i> . First appearance of mammalian remains in <i>microlestes</i> and <i>dromatherium</i> . Tracks of saurians and birds (?) both in Europe and America. First appearance of crawfish-like crustaceans. A remarkable coal field near Richmond, Va., with an abundant fossil flora. All classes of the vertebrata, viz., fishes both of the cartilaginous and bony forms, reptiles, amphibia, birds, and mammals, are represented in this epoch.

TABULAR ARRANGEMENT OF THE GEOLOGICAL FORMATIONS (*continued*).

PALÆOZOIC.	PERMIAN.	<i>Permian.</i> Upper Permian. Middle Permian, or • Magnesian limestone. Lower Permian.	Sometimes regarded as a group of passage beds from the coal measures to the triassic. Molluscan fauna not abundant. Brachiopoda, some of which are common to the carboniferous. Last appearance of the genus <i>productus</i> . Bryozoa abundant. Fossil fishes mostly of genera common to the carboniferous. The flora is mainly peculiar to the group, but some species are common to this and the coal measures.
	CARBONIFEROUS.	<i>Coal measures and upper limestones.</i> Upper carboniferous limestones and shales. Upper and low'r coal measures. Conglomerate. Red shales, &c., at base.	Bryozoa and brachiopoda abundant, lamellibranchiata common; some corals, echinoidea, crinoidea, cephalopoda. First appearance of batrachian reptiles and air-breathing mollusca, insects, scorpions, and shrimp-like crustaceans; and last appearance of trilobites. Ganoid fishes numerous. Land plants, as tree ferns, <i>sigillaria</i> , <i>stigmaria</i> , <i>calamites</i> , &c.
		<i>Lower carboniferous limestones.</i> Chester or Kaskaskia limestone. St. Louis limestone. Warsaw limestone. Keokuk limestone. Burlington limestone.	Corals not abundant. <i>Bryozoa</i> abundant in the upper members. Brachiopoda abundant. Mollusca common throughout. Crinoidea extremely abundant. Echinoidea and blastoidea very abundant, the latter more common in the upper members, which contain fewer crinoidea. Cestraciant fishes abundant. (Formation calcareous.)
		<i>Waverley group.</i> Conglomerates. Sandstones, shales, and limestones in thin beds.	Brachiopoda and lamellibranchiata, bryozoa, crinoidea. Fish remains. Fossil ferns. Marine plants of the genus <i>dictyophyton</i> . Land plants of the genera <i>sigillaria</i> , <i>lepidodendron</i> , <i>calamites</i> , &c.
	DEVONIAN.	<i>Catskill group.</i> Conglomerates. Sandstones. Red, green, and olive shales and sandstones.	Remains of ganoid fishes (<i>holoptychius</i>) abundant, with fucoids and many land plants, as ferns, &c.
		<i>Chemung group.</i> Sandstones, shales, and conglomerate. Limestone in the west.	Fucoids and land plants. Lamellibranchiate shells and brachiopods abundant. Gasteropods, cephalopods, and crustaceans rare. Crinoidea and bryozoa not common. Remains of cestraciant fishes. In the calcareous beds of the western extension are many corals, stromatopora, brachiopods, &c.
		<i>Portage group.</i> Shales and sandstones.	Fucoids and land plants; crinoidea. Lamellibranchiata and brachiopoda rare. Cephalopoda (<i>goniatites</i>) common. Fish remains of remarkable forms, belonging to the genera <i>dinichthys</i> , <i>aspidichthys</i> , <i>ctenacanthus</i> , &c.
		<i>Hamilton group.</i> Shales, calcareous shales, limestones, &c.	Fucoids (<i>spirophyton</i>) and land plants abundant in certain beds. Lamellibranchiata and brachiopoda abundant. Gasteropoda and cephalopoda common. Crustacea, crinoidea, and corals abundant.
		<i>Upper Helderberg group.</i> Corniferous and Onondaga limestones. Schoharie grit.	Corals, bryozoa, and brachiopoda abundant. Gasteropoda and lamellibranchiata common. Among the cephalopoda the genus <i>goniatites</i> is first noticed. Crustacea (trilobites of extravagant forms) common. Teeth, body plates, and spines of fishes, mostly cestraciant, appear for the first time, some of them of very ponderous dimensions. <i>Macropetalichthys</i> , <i>onychodus</i> , &c. Land plants make their first appearance, with the exception of upper Silurian (?) in Nova Scotia.
		Caudagalli grit.	Fossils extremely rare. Some marine plants (<i>spirophyton</i>).
	UPPER SILURIAN.	Oriskany sandstone.	Brachiopoda abundant and of remarkable forms. Gasteropoda abundant. Lamellibranchiata and crinoidea few.
		<i>Lower Helderberg group.</i> Upper pentamerus limestone. Shaly limestone. Pentamerus limestone. Tentaculite limestone.	Corals and bryozoa. Brachiopoda and gasteropoda abundant. Crinoidea, cystidea, and crustacea common. Lamellibranchiata and cephalopoda few. <i>Petrospongia</i> , &c.
		Waterlime.	Crustacea of the genera <i>eurypterus</i> , <i>pterygotus</i> , <i>ceratiocaris</i> , &c.
		<i>Onondaga or Salina formation.</i> Magnesian and argillaceous limestones. Red, gray, and greenish marls.	The formation essentially non-fossiliferous.
	MIDDLE SILURIAN.	<i>Niagara group.</i> Limestones. Shales.	Sponges, corals, bryozoa, crinoidea, brachiopoda, and crustacea abundant. Cephalopoda common. Lamellibranchiata and gasteropoda few.
		<i>Clinton group.</i> Shales, sandstones. Limestones, iron ore. <i>Medina group.</i> Medina sandstone.	Marine plants abundant. Bryozoa, graptolites, brachiopoda, a few lamellibranchiata, gasteropoda, cephalopoda, crustacea, and crinoidea.
		<i>Anticosti group</i> , island of Anticosti, representing the Clinton and Medina groups.	Highly fossiliferous in brachiopoda and mollusca, with bryozoa, corals, and crustacea.

TABULAR ARRANGEMENT OF THE GEOLOGICAL FORMATIONS (*continued*).

PALÆOZOIC.	UPPER CAMBRIAN (Sedg.) OF LOWER SILURIAN (Mur.).	Shawangunk or Oneida conglomerate.	Non-fossiliferous limit between Silurian and Cambrian systems.
		<i>Hudson river group.</i> Sandstone and shales. Calcareous shales. Do. and limestones. Utica slate.	Marine plants, graptolites, crinoidea, bryozoa, and brachiopoda abundant. True corals few. Lamellibranchiata in some localities abundant. Gastropoda, cephalopoda, and crustacea common.
		<i>Trenton group.</i> Trenton and Galena, Black river, and Birdseye limestones.	Marine plants, crinoidea, cystidea, bryozoa, brachiopoda. Cephalopoda (<i>orthoceras</i>) and crustacea abundant. Lamellibranchiata and gastropoda common. Corals few.
	MIDDLE CAMBRIAN.	<i>Taconic system of Emmons.</i> (<i>Quebec group of Logan.</i>) Chazy limestones. Levis shales and sandstones. Crystalline limest's (marbles). Dolomitic conglomerate. Calciferous sandstone.	Graptolites, crinoidea, and cystidea. Brachiopoda. Some mollusca and many trilobites.
EZOZOIC.	LOWER CAMBRIAN.	<i>Potsdam group.</i>	Graptolites. Crustacea (trilobites) abundant. Brachiopoda in linguloid and oboloid forms abundant.
		Sandstones, slates, &c. Braintree, Mass., St. John, N. B., and Newfoundland.	Crustacea. Genus <i>paradoxides</i> and other primordial forms. Crustacea in numerous trilobites of the genera <i>paradoxides</i> , <i>conocoryphe</i> , <i>agnostus</i> , and others.
	HURO- NIAN.	Sandstones, conglomerates, shales, and limestones. Specular iron ores.	Crystalline and subcrystalline; non-fossiliferous so far as known.
	LAUREN- TIAN.	Labradoritic rock. Crystalline limestones. Gneiss in great variety, with iron ores.	Highly crystalline, and for the most part non-fossiliferous. The serpentine limestones contain the fossil called <i>eozoön</i> , the organic nature of which is advocated by some and disputed by others.

PALÆOTHERIUM (Cuv.; Gr. *παλαίος*, ancient, and *θρίον*, animal), the type of a tribe of fossil ungulates belonging to the family of *perissodactyla* (Owen), or those having an uneven number of toes, intermediate between the tapir and the rhinoceros. The form was like that of the tapir; the raised nasals show that it had a small flexible proboscis; the feet were



Palæotherium (restored).

three-toed; it had projecting canines, and molars $\frac{7}{4}$, the upper like those of the rhinoceros, the first smallest and single lobed, and the lower formed by two successive crescents with

their convexity external, the first single and the last one trilobed. Several species are described by Cuvier and others, of which the largest and best known is the *P. magnum* (Cuv.), of the size of a horse, but of a stouter form; others vary in size from that of a hog and sheep to that of a hare. They belong especially to the gypsum of Europe (eocene), are abundant in the plaster quarries of Montmartre, near Paris, and extend even into the lower miocene; the species differ little, except in size.

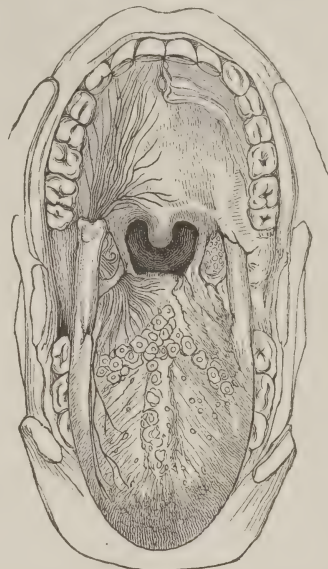
PALAFOX Y MELZI, José, a Spanish patriot, born in Aragon in 1780, died in Paris, Feb. 16, 1847. At an early age he became an officer of the royal body guard, and as such accompanied Ferdinand VII. to Bayonne in 1808. Ferdinand was retained a prisoner, but Palafox escaped to his estate near Saragossa. Shortly after that city was menaced by the French army under Lefebvre-Desnouettes, and the populace proclaimed Palafox captain general of Aragon (May 25). Soldiers from the adjacent country were called into the city, barricades were erected in every street, and nearly every house was made a point of defence. After a siege of 61 days the French retired; but they returned in greater force successively under Moncey, Mortier, Junot, and Lannes, and the city capitulated in February, 1809. Palafox, being ill, was not in active command at the time. The capitulation provided that he should depart free, and that no one should be molested; but the city was pillaged, blood was profusely shed, and Palafox was sent a prisoner to Vincennes. He was only released on the restoration of Ferdinand

VII. in 1814, when he returned to Madrid with the king, and was confirmed in his post of captain general of Aragon. In 1820 he retired from office and pronounced in favor of the constitution, and in 1823 signed a protest against the absolutism of Ferdinand VII. In 1833 he joined the party of Queen Isabella, was imprisoned for a time on a false charge, and in 1836 was made duke of Saragossa.

PALAMEDES, a legendary Greek hero, son of Nauplius and Clymene. He served in the expedition against Troy, and for a time was commander-in-chief in place of Agamemnon, whose measures he opposed. According to the old Cyprian epic, he was drowned while fishing, by Diomedes and Ulysses; but a later tradition is that he was accused of treason by Ulysses, who concealed gold or a forged letter from Priam in his tent, and then charged him with having been bribed by Priam. When Palamedes was led out to die, he exclaimed: "Truth, I lament thee, for thou hast died even before me." He is not mentioned by Homer, but was made the subject of tragedies by Æschylus, Sophocles, and Euripides, and by some represented as the inventor of lighthouses, weights and measures, dice, and the alphabet.

PALATE, the bony and muscular partition which separates the mouth in vertebrate animals from the anterior and posterior nasal cavities. The bony or hard palate forms the roof of the mouth, and consists of the horizontal portion of the superior maxillary bones in front and of the palate bones behind; these form a parabolic arch, bounded in front and on the sides by the upper teeth and their sockets, covered by mucous membrane, and giving attachment posteriorly to the *velum palati* or soft palate. The width, contractions, elevations, extent, and perforation by larger or smaller incisive or other openings, are valuable characters in estimating the rank of the various subdivisions of vertebrates, those being the highest in which this part is broadest, uniform, and least pierced by foramina, making a complete partition as in man; the changes in the palate bones are connected with corresponding modifications in the sphenoid, and consequently with the whole anatomy of the skull. The soft palate is a movable muscular partition, covered by mucous membrane; its free edge floats above the base of the tongue, having in its centre a conical appendage, the *uvula*, and on its sides the so-called "palatine arches," of which there are two on each side, the anterior and the posterior; they consist of crescentic folds of mucous membrane enclosing muscular fibres. The triangular space between the two arches on each side is occupied by the tonsils. The irregularly circular orifice embraced by the palatine arches, which leads from the back part of the mouth into the pharynx, is the "isthmus of the fauces." The mucous membrane of the palate is studded with mucous follicles; its arteries are derived from the external carotid, and its nerves from the

trifacial, the glosso-pharyngeal, and Meckel's ganglion. The muscles of the palatal regions are the *circumflexus palati*, from the internal surface of the pterygoid process to the velum, stretching horizontally the soft palate, and di-



The mouth widely open, showing the tongue below, and the hard and soft palate and uvula above, with the isthmus of the fauces in the centre. On the left are shown the fibres of the glosso-pharyngeal and palatine nerves, distributed to the mucous membrane.

lating the Eustachian orifice; the *levator palati*, from the petrous portion of the temporal bone, raising the palate and carrying it backward; the *azygos uvulae*, vertical, forms the chief part of this organ, raising it with the palate; the *palato-pharyngeus* forms the posterior pillar of the palate, depressing the velum and elevating the pharynx; the *constrictor isthmi faucium*, in the anterior pillars, extending from the base of the tongue to the velum, depresses the latter and elevates the former. The soft palate is endowed with acute sensibility, and in the neighborhood of the uvula and its arches, and to a less degree on its anterior portion, ministers to the specific sense of taste. The mucous membrane of the palate is subject to inflammations, and the bones are attacked in syphilis and other cachectic diseases; these parts are also liable to arrests of development, in which the mouth and nasal cavities communicate through a fissure, with or without hare-lip. In this deformity deglutition is difficult, sucking impossible, and the voice indistinct and nasal; surgery is necessary for its relief, and by the operation of staphyloraphy, which consists in placing and keeping in apposition the incised edges of the fissure, a partial or complete closure may be effected; where this is impracticable, relief may be obtained from gutta percha or metallic plates.

PALATINATE, The Upper and Lower, two separate states of the old German empire, not contiguous, though under one ruler. Their territory is now comprised in that of Bavaria, Baden, Hesse-Darmstadt, and Prussia. The word palatine is related to palace, and as a title dates from the time of the Merovingian kings of France, connected with whose court was a high judicial officer called the *comes palatii*, or master of the royal household, who had supreme authority in all causes that came by fiction to the king. When the sovereign chose to confer a peculiar mark of distinction upon the holder of any particular fief under him, he granted the right to exercise the same power within his province as the *comes palatii* exercised in the royal palace. With the function went the title of *comes palatinus*, or count palatine; and from the ruler the district under him became finally known as a palatinate.—The Upper Palatinate was bounded by Baireuth, Bohemia, Neuburg, Bavaria, and the territory of Nuremberg, and now forms in the kingdom of Bavaria a part of the districts of the Upper Palatinate and Upper Franconia. Its area was about 2,760 sq. m. The chief town was Amberg. The Lower Palatinate was situated on both sides of the Rhine, and was bounded by Katzenellenbogen, Mentz, Würtemberg, Baden, Alsace, Lorraine, and Treves. The chief cities were Mannheim and Heidelberg. Its area was about 3,150 sq. m., and it comprehended the principalities of Simmern, Zweibrücken, Veldenz, Lautern, and the county Palatine properly so called. The hereditary sovereignty of the counts palatine over these districts dated from the 11th century. In the 13th century they assumed the dignity of electors. Rupert III. was elected emperor (1400). On his death the country was divided by his four sons. Frederick III. (1559–'76), of the Simmern line, under which it became reunited, introduced Calvinism. Frederick V. was elected king of Bohemia on the outbreak of the thirty years' war, but lost both his royal and electoral crowns by the defeat at Prague (1620), Maximilian of Bavaria receiving the electoral dignity. Frederick's son Charles Louis regained the Lower Palatinate, as eighth elector, by the peace of Westphalia (1648). The Simmern line, ending with his son Charles, was succeeded by that of Neuburg (1685). During this period the Rhenish Palatinate was repeatedly desolated by the armies of Louis XIV. In 1777 the elector Charles Theodore inherited Bavaria, and the two states were united. During the wars of the French revolution, France took possession of that part of the Palatinate that lay on the left bank of the Rhine, other parts being ceded to Baden, Nassau, and Hesse-Darmstadt; but after the fall of Napoleon the main portion was returned to Bavaria. At present the Bavarian district of the Upper Palatinate and Ratisbon has an area of 3,731 sq. m.; pop. in 1871, 497,960. The district of the Rhenish (Lower) Palatinate has an area of 2,293 sq. m.; pop. 615,104.

PALATINE (Hung. *nádor*), under the old Hungarian constitution, the title of the royal lieutenant, in later periods officiating as mediator between the nation and king, and as president of the upper house of the diet. The archduke Joseph, brother of the emperor Francis, and his son Stephen, were the last palatines, the latter officiating at the beginning of the Hungarian revolution of 1848.—The term was also used as a title (Pol. *wojewoda*) of the governors of the larger divisions or provinces (*województwa*, palatinates) of independent Poland.—For COUNT PALATINE, see PALATINATE.

PALEMBANG. I. A Dutch province in the S. E. part of the island of Sumatra, between the strait of Banca and the province of Bencoolen; area, 61,911 sq. m.; pop. in 1872, 573,697. It is for the most part a marshy plain, watered by several large rivers, and covered by extensive forests. The W. part is mountainous. The soil is fertile, and the climate hot and moist, but not unhealthy. The cultivated crops are rice, sugar cane, tobacco, gambir, indigo, coffee, and pepper. All the animals of the forests and other parts of Sumatra are found in Palembang; and the chief domesticated ones are buffaloes, goats, sheep, hogs, and poultry. The inhabitants consist of the descendants of Javanese, of Malays, of an aboriginal people called Kumring, and of a wild race known as Kubu, with a few Arabs and Chinese. The former kingdom of Palembang, about one fourth the size of the present province, was ruled by a sultan, with whom the Dutch had a treaty. In 1811, when Java and its dependencies were occupied by the British, the Dutch officials at Banca fell into the hands of the sultan, who put all of them to death, to ingratiate himself with the new rulers. The English sent an expedition which dethroned him, annexed part of his dominions, and placed his younger brother in authority. When Java was restored to the Dutch, he resumed his rule, and kept them at defiance till 1821, when Palembang was finally subdued. **II.** A town, capital of the province, on the Musi or Sungsang, the most important river of Sumatra, about 50 m. from the strait, lat. 2° 45' S., lon. 105° E.; pop. about 40,000. It lies on both banks of the river, which is here 400 yards broad with a depth of from 8 to 9 fathoms, and sufficient water all the way from the sea for large vessels. The only buildings of stone are the mosque and the tombs of the sultans. Trade is carried on with Java, Banca, Siam, China, and the Straits Settlements.

PALENCIA. I. A N. province of Spain, in Old Castile, bordering on Santander, Burgos, Valladolid, and Leon; area, 3,125 sq. m.; pop. in 1870, 184,668. It is watered by the Carrión, Cueva, Pisuerga, and several other rivers, and the canal of Castile passes through it. A portion of the N. part is mountainous; the remainder is level and almost totally devoid of trees. Coal, chalk, gypsum, saltpetre, and copper ore are found. The climate is cold but healthy, and the soil is fertile; wine, grain,

vegetables, and fruits are produced. Blankets and other woollen goods are manufactured. Among the principal towns are Cervera, Saldaña, and Carrion. **II.** A city (anc. *Pallantia*), capital of the province, on the left bank of the river Carrion, 117 m. N. N. W. of Madrid; pop. about 13,000. The river is crossed by several fine bridges, and the town is protected by a strong wall. It contains a cathedral, begun in the 14th century and finished in the 17th, several churches and convents, an episcopal palace, a former royal palace, several charitable institutions, including a founding hospital, an academy and numerous schools, a picture gallery, and a library. About one third of the population are employed in woollen manufactures. The town was a place of importance in the time of the Romans. In honor of the bravery displayed by the women of Palencia, in their successful defence of the city when besieged by the Black Prince, they were permitted by John I. to wear a golden band upon their heads. It was occupied by the French in 1808, and by the English in 1812.

PALENQUE, Ruins of, remarkable aboriginal remains on the Rio Chacamas in the state of Chiapas, Mexico, 8 m. S. E. of Santo Domingo de Palenque. They consist of artificial terraces, or terraced, truncated pyramids, of cut stone, surmounted by edifices of elaborate plan, covered with figures and hieroglyphics in relief or in stucco, and showing evidences of having once been painted in brilliant colors. The principal structure, known as the palace, stands on a truncated terraced pyramid, faced with cut stone, 310 ft. long and 260 ft. broad at the base, and 40 ft. high. It is 228 ft. long, 180 ft. deep, and 25 ft. high, with a broad, projecting cornice of stone. It is constructed of cut stones cemented with a mortar of lime and sand, and the entire face was once covered with stucco and painted. The piers are ornamented with bass reliefs in stucco, with borders of hieroglyphics, which show a better knowledge of the anatomy of the human figure than has been found among the other works of the aboriginal nations of America. In one of the courts are a number of stucco tablets, and one of stone which represents a figure seated cross-legged, after the manner of Buddha in some of the Hindoo sculptures and paintings, on a seat carved with the figures of jaguars, before which kneels another figure, richly dressed, in the act of presenting some object highly ornamented. There are several hieroglyphical figures on the tablet, below which are traces of a table of stone, perhaps an altar. Another building is 75 ft. long and 25 ft. deep, with solid walls on all sides except the north, which has five doorways and six piers. The whole front is richly ornamented in stucco, and the two corner piers are covered with hieroglyphics, 96 squares to each pier. The four piers dividing the doorways are ornamented with female figures, well executed, surrounded with borders of hieroglyphics. There

are three inner rooms, with a corresponding number of doorways, between which are massive stone tablets set in the wall, 13 ft. long and 8 ft. high, covered with hieroglyphics, 240 squares or combined figures in each. In another structure a tablet exhibits a group of human figures, apparently in the act of making a solemn sacrifice. There are other similar structures with tablets covered with human figures in relief and hieroglyphics, some of which seem to have been dedicated to religious purposes, while most of them probably were dwellings, each inhabited by a number of families. The pavements are skilfully constructed of large blocks of stone.—The ruins were discovered by the Spaniards in 1750, explored by Bernasconi in 1784, by Del Rio in 1787, and by Du Paix in 1807, whose account was published in 1834. In 1822 M. Frédéric de Waldeck started for the exploration of the ruins, and during a stay of several years made many elaborate drawings and plans. In 1840 they were explored by J. L. Stephens and F. Catherwood, and their account, illustrated with drawings and plans, was soon after published. (See Stephens's "Incidents of Travel in Central America, Chiapas, and Yucatan," and Catherwood's "Views of Ancient Monuments in Central America, Chiapas, and Yucatan.") They were visited in 1846 by Arthur Morelet, who published *Voyage dans l'Amérique Centrale* (Paris, 1857; translated into English, "Itza, or the Unexplored Region of Central America," New York, 1860).

PALERMO. **I.** A N. W. province of Sicily, bordering on the Mediterranean and the provinces of Messina, Catania, Caltanissetta, Girgenti, and Trapani; area, 1,964 sq. m.; pop. in 1872, 617,678. It is the largest and most populous of the Sicilian provinces. The coast is irregular and the surface is hilly, but there are many very fertile valleys. The country has a general slope N. toward the Mediterranean. Its streams are numerous but small. It produces grain, oil, fruits, almonds, manna, sumach, liquorice, and silk. **II.** A city (anc. *Panormus*), capital of the province and of the island of Sicily, in lat. 38° 6' N., lon. 13° 20' E., 120 m. W. by S. of Messina; pop. in 1872, 219,398. It is on the N. side of the island, on a deep bay between Capes Gallo and Zaffarana, and in a rich plain which is surrounded on the land side by two distinct mountain ridges. This enclosure between the hills and the sea has been called from its form and beauty the Conca d'Oro, or golden shell. The situation is extremely picturesque, and the numerous spires, domes, and towers present a striking appearance. The climate is delightful, especially in winter, when many invalids and other strangers reside here. The harbor, formed by a mole about 1,300 ft. long, is spacious. The city proper is nearly rectangular, and forms an oblong parallelogram, about 4 m. in circumference. It is surrounded by decayed walls, entered by four main and many minor gates,

and defended by bastions. The harbor is protected by a strong citadel and Forts Galita and Sant' Erasmo, and the lighthouse battery. Palermo is divided into four nearly equal parts by the corso Vittorio Emanuele (previous to 1860 the Cassaro or via Toledo) and the corso Garibaldi (formerly via Macqueda or strada Nuovo), which intersect each other at right angles in the centre of the city. The longer of these runs from the sea to the royal palace, which is at the inland extremity of the city. At their intersection is the large piazza Vigliena or Quattro Cantoni, which is octagonal, having upon four sides the vista of these streets, and upon each of the others a handsome building in the Grecian style. There is a larger square before the palace, in which is a bronze statue of Philip IV. of Spain. Numerous smaller streets without any regular plan run into these two, but are all narrower

and dirty. The whole city is well paved with large blocks of lava. The Marina, a terrace 80 yards wide, extending for about a mile along the seaside, is the finest and most popular place of public resort. The corso Garibaldi contains more churches and palaces and the corso Vittorio Emanuele more shops, and both are alike remarkable for animation. Every house is abundantly supplied with pure water from the numerous reservoirs (*giarre*), which were originally established by the Saracens, generally at the corners of the streets. The houses generally are built in the same style as those of Naples, with flat roofs, terraces, and Venetian blinds; they are divided into flats, each flat forming a distinct dwelling.—The principal public edifice is the royal palace, at the S. W. extremity of the town. The cathedral is a Gothic structure of the 12th century, to which a modern dome has been added; the



Cathedral of Palermo.

interior is supported by 80 pillars of oriental granite, and divided into chapels. This cathedral contains many mausolea in red porphyry, among them those of Roger, the Norman founder of the Sicilian monarchy, and the emperor Frederick II. The south porch is the most highly ornamented, and has a celebrated marble doorway exquisitely carved. The crypt, E. of the choir, popularly called Tutti i Santi, and occasionally the catacombs, measures about 100 ft. from N. to S. and 30 ft. from E. to W. exclusive of the apses, and contains more than 20 sarcophagi with the remains of local archbishops. The chapel of Santa Maria, the place of coronation of the Sicilian kings, was destroyed by the bombardment of 1860. The richest of all chapels is that of Santa Rosalia, constructed in 1631, some time after the discovery of a chest of solid silver of the weight of nearly 1,300

lbs., containing the remains of that patron saint of Palermo. (See *Die Cathedrale zu Palermo*, by Becker and Förster, folio, Vienna, 1866.) Palermo is distinguished for the number and magnificence of its churches. One of the most gorgeous is that of Santa Caterina, finished in 1596. It is a large edifice of Corinthian architecture in the shape of a cross, with a single aisle and a dome. Within the choir the pavement consists of marbles in Florentine mosaic. The most celebrated among the numerous paintings is a Madonna, variously attributed to Rubens and to Vandyke. The Casa Professa, consecrated in 1636, and formerly belonging to the Jesuits, is remarkable for its size and adornments, and contains some of the finest of Novelli's pictures. Red, white, and black marbles are conspicuous in many parts of this church. Among other churches noted for magnificence is that of San Domenico, founded

in 1640 by the Dominicans, and built in the Roman Doric style, divided into three aisles by 16 large columns of gray marble, and accommodating nearly 12,000 persons. The church serves also as a Pantheon (Santa Croce), and has many monuments of distinguished Sicilians. The church of Mortorana or Santa Maria dell' Amiraglio, popularly called San Simone, is one of the earliest Norman edifices in Sicily, of the 12th century. The exterior has been modernized, but the interior retains some of the original mosaics. The church of San Giuseppe de' Tiatini, begun in 1612 and completed in 1645, is of composite architecture and supported by 26 massive columns in the nave and aisle. Santa Maria della Catena, or Parrocchia della Kalsa, dates from the 14th century, excepting the W. front, remarkable for a strikingly picturesque portico, which was rebuilt about 200 years later. It contains many chapels and many sepulchral monuments. The private chapel of the royal palace, built by Roger, first king of Sicily, in the form of a basilica, although small, has all the characteristics of a large church. Almost the whole of the walls and dome is covered with mosaic pictures on a gold ground. Palermo is the see of an archbishop. It was formerly noted for the number of its monasteries and nunneries, but these were suppressed in 1867. Among them were La Gancia (S. Maria degli Angioli), formerly the most extensive and renowned, and the Capuchin monastery outside the city, with celebrated subterranean vaults, where the standing bodies of the dead present a ghastly spectacle. An ancient subterranean cemetery (*Le catacombe*) was discovered in 1785 outside the gate of Ossuna. The teatro Belloni, rebuilt in 1803, is the largest and most fashionable theatre, and there are five others. The festival of Santa Rosalia is celebrated July 11-15 by fireworks, the procession of the saint's car, and illuminations in La Flora, the principal public park and a familiar lounge, at the S. end of the Marina. The university of Palermo, founded in 1447, has a valuable collection of antiquities and a library of 40,000 volumes. In 1873 there were 56 professors and 306 students. There are also an academy of sciences, a nautical school, a museum with large art collections, a conservatory of music, a botanic garden, and many other institutions for the promotion of learning, including an observatory about 250 ft. high (in the royal palace), celebrated through the discoveries of Piazzi and other astronomers, and possessing renowned astronomical instruments. The public charities embrace several hospitals, a foundling institution, and a lunatic asylum.—The city has a supreme court of justice, a court of

appeal, and a commercial tribunal. The chief manufacture is silk; cotton, oil cloth, gold and silver articles, and hardware are also produced. The total value of exports for the year ending Sept. 30, 1873, was \$9,078,090, of which \$4,125,250 were for oranges, lemons, and other fruits; of the exports, \$2,327,492 were to the United States. The value of the imports was \$4,254,260. The tunny fishery carried on from the town is very productive.—N. W. of the city is the Monte Pellegrino, an abrupt rocky mass, famed for a cave or grotto to which St. Rosalia, a Norman princess, retired to lead a contemplative life; it is now a sanctuary, and an annual pilgrimage is made to it from Palermo in solemn procession on July 15.—Palermo was the earliest settlement of the Phœnicians in Sicily, and became the chief seat of their power there. It was by the Greeks called Panormus, a name derived from the excellence of the anchorage near it. In 480 B. C. the city was taken by the Carthaginians, who kept possession of it till 276, when it was captured by Pyrrhus, king of Epirus; but it was soon retaken by the Carthaginians. It was taken by the Romans in the first Punic war, 254 B. C., and was a colony throughout the continuance of the empire. It fell into the hands of the Goths, was wrested from them by the Byzantine general Belisarius, and in A. D. 835 was taken by the Saracens; it was by them made the capital of the island, and retained the same dignity under the Norman kings, who in the 11th century drove out the infidels, and in the 12th founded the kingdom of Sicily. The court resided at Palermo until Sicily was united to the kingdom of Naples. The city has suffered much from earthquakes. During the insurrection of 1848 it was bombarded by the royal troops. Garibaldi, having landed in Sicily May 13, 1860, entered Palermo on the 26th, conquering it after a protracted fight in the streets; and by convention the Neapolitan army evacuated the city on June 6, when it became the seat of the provisional government. An insurrection against the abolition of the monastic orders broke out in September, 1866, but was suppressed by the royal troops after much bloodshed.

PALES, in Roman mythology, the tutelary deity of flocks and shepherds, holding nearly the same place in the religious worship of Rome that Pan held among the Greeks, and represented by some writers as a male and by others as a female. The festival of Pales, called *Palilia*, was celebrated on April 21, the anniversary of the foundation of Rome by Romulus. The principal rites were the purification of the stables, flocks, and herds by fire and smoke, and the offering of cakes, millet, and milk, followed by prolonged jollity and feasting.

APPENDIX.

The following tables are compiled from advance sheets of vol. iii. of the Canadian census of 1871, now (May, 1875) passing through the press, which were received too late for use in the articles NEW BRUNSWICK, NOVA SCOTIA, and ONTARIO:

FARM PRODUCTS, &C.

	New Brunswick.	Nova Scotia.	Ontario.	Quebec.	Total.
Improved farm land, acres.....	1,171,157	1,627,091	8,888,626	5,703,944	17,935,818
Land under crops, acres.....	778,461	790,155	6,537,493	3,714,304	11,820,358
Land in pasture, acres.....	885,105	823,322	2,089,177	1,943,182	5,240,786
Wheat, bush.....	204,911	227,497	14,233,389	2,058,076	16,723,878
Barley, bush.....	70,547	269,050	9,461,233	1,668,208	11,496,038
Oats, bush.....	3,044,134	2,190,099	22,188,953	15,116,262	42,489,458
Rye, bush.....	23,792	33,987	547,609	453,970	1,064,358
Peas, bush.....	26,850	19,740	7,653,545	2,205,535	9,905,720
Beans, bush.....	18,206	15,463	107,925	79,050	220,644
Buckwheat, bush.....	1,231,091	234,157	585,158	1,676,078	3,726,434
Indian corn, bush.....	27,658	23,349	3,143,467	603,356	3,802,530
Potatoes, bush.....	6,562,355	5,560,975	17,138,534	18,068,323	47,330,187
Turnips, bush.....	603,721	463,139	22,455,543	812,073	24,339,476
Other roots, bush.....	98,358	150,339	2,706,903	597,160	3,553,260
Hay, tons.....	844,793	443,732	1,804,476	1,225,640	3,318,641
Grass and clover seed, bush.....	8,233	8,121	189,716	142,535	343,605
Butter, lbs.....	5,115,947	7,161,867	37,623,643	24,239,127	74,190,584
Home-made cheese, lbs.....	154,758	834,853	3,432,797	512,435	4,934,843
Dressed flax, lbs.....	37,345	111,538	1,165,117	1,270,215	2,584,765
Apples, bush.....	126,395	342,513	5,486,504	409,903	6,365,313
Grapes, lbs.....	1,705	8,167	1,023,431	88,099	1,126,402
Other fruits, bush.....	2,471	12,736	242,373	100,378	358,963
Maple sugar, lbs.....	380,004	151,190	6,247,442	10,497,418	17,276,054
Tobacco, lbs.....	454	263	399,370	1,195,345	1,595,932
Hops, lbs.....	10,901	12,330	1,188,940	499,568	1,711,739
Home-made linen, yards.....	74,241	111,937	25,502	1,559,410	1,771,140
Home-made cloth, yards.....	1,050,323	1,476,003	1,775,320	3,339,766	7,641,917
Horses, number.....	36,322	41,925	363,535	196,339	643,171
Colls and fillies, number.....	8,464	7,654	120,416	57,093	193,572
Working oxen, number.....	11,132	32,214	47,941	43,343	139,635
Milch cows, number.....	33,220	122,638	635,739	406,542	1,251,209
Other horned cattle, number.....	69,335	119,065	716,474	328,572	1,233,446
Sheep, number.....	294,413	398,377	1,514,914	1,907,600	3,135,509
Swine, number.....	65,305	54,162	674,664	371,452	1,366,083
Wool, lbs.....	796,163	1,132,703	6,411,305	2,763,304	11,103,480
Honey, lbs.....	90,004	21,374	1,239,612	643,310	1,999,300

FOREST PRODUCTS.

	New Brunswick.	Nova Scotia.	Ontario.	Quebec.	Total.
Square pine:					
White, cubic feet.....	830,920	233,638	14,791,203	8,376,060	24,236,821
Red, cubic feet.....	60,139	22,020	1,524,698	347,515	1,954,372
Square oak, cubic feet.....	7,360	96,494	3,144,554	53,635	3,302,043
Tamarack, cubic feet.....	360,825	116,816	1,223,444	3,994,878	5,695,963
Birch and maple, cubic feet.....	827,345	518,727	92,290	500,995	1,939,357
Elm, cubic feet.....	1,250	200	1,777,905	53,299	1,832,654
All other timber, cubic feet.....	2,192,728	3,090,508	10,942,721	10,432,704	26,703,661
Pine logs,* number.....	1,214,485	477,187	5,713,204	5,011,532	12,416,408
Other logs,* number.....	3,533,152	897,595	1,255,090	3,628,720	9,314,557
Masts, spars, &c., number.....	11,356	10,631	4,376	94,322	121,635
Staves, thousands.....	747	11,311	20,964	1,184	34,706
Lath wood, cords.....	2,490	924	15,095	7,143	25,657
Tan bark, cords.....	28,223	12,338	30,554	91,051	162,521
Fire wood, cords.....	545,679	526,472	4,519,320	3,121,612	8,713,033

PRODUCTS OF FUR-BEARING ANIMALS.

	New Brunswick.	Nova Scotia.	Ontario.	Quebec.	Total.
Beaver skins, number.....	752	676	10,575	36,148	48,151
Bear skins, number.....	313	209	850	1,181	2,553
Otter skins, number.....	344	267	2,033	3,433	6,132
Marten skins, number.....	1,063	156	4,521	11,342	17,582
Mink skins, number.....	1,970	4,269	24,433	19,072	49,739
Fox skins, number.....	1,172	823	5,775	5,036	12,861
Muskrat skins, number.....	13,972	20,449	263,931	134,830	433,182
Other skins, number.....	1,420	15,359	33,659	61,840	112,778

* The standard log of the census contains 100 feet of lumber in board measure.

PRODUCTS OF FISHERIES.

	New Brunswick.	Nova Scotia.	Ontario.	Quebec.	Total.
Vessels employed, number.....	139	722	20	110	991
Boats employed, number.....	3,003	7,940	1,154	4,779	16,876
Men employed, number.....	6,039	13,206	2,380	10,873	37,498
Cod, quintals.....	37,381	380,308	.....	264,742	682,631
Haddock, hake, and pollock, quintals.....	17,290	101,042	.....	1,881	120,213
Herring, barrels.....	181,792	135,266	9,814	90,428	417,300
Gaspereaux (alewives), barrels.....	18,534	10,858	.....	225	29,117
Mackerel, barrels.....	2,421	69,647	.....	5,857	77,925
Sardines, barrels.....	10	25	.....	6,457	6,492
Halibut, barrels.....	133	2,536	.....	891	3,560
Salmon, barrels.....	6,340	4,218	.....	5,349	15,907
Shad, barrels.....	3,532	7,183	.....	1,665	12,380
Whitefish, barrels.....	57	14	21,445	1,501	23,017
Trout, barrels.....	280	372	17,353	1,724	19,729
Other fish, barrels.....	9,553	2,629	12,663	63,995	88,845
Oysters, barrels.....	13,243	1,257	.....	.....	14,501
Medicinal cod liver oil, gallons.....	217	1,405	.....	869	2,490
Other fish oil, gallons.....	75,826	257,925	3,622	309,080	676,403

The principal mineral productions returned in the census are as follows: New Brunswick, 3,070 tons of iron ore, 13,502 of coal, and 13,659 of lump gypsum; Nova Scotia, 19,331 oz. of gold, 3,566 tons of iron ore, 657,506 of coal, and 96,544 of lump gypsum; Ontario, 199 oz. of gold, 69,197 of silver, 1,934 tons of copper ore, 30,726 of iron ore, and 12,969,435 gallons of crude petroleum; Quebec, 3,411 oz. of gold, 11,326 tons of copper ore, 92,001 of iron ore, and 2,300 of pyrites. The copper and iron ores contain 25 per cent. of metal.

MANUFACTURES.

PROVINCES.	Capital invested.	Number of hands employed.	Amount of yearly wages.	Value of raw material.	Total value of products.
New Brunswick.....	\$5,976,176	18,352	\$3,869,360	\$9,481,760	\$17,367,637
Nova Scotia.....	6,041,966	15,595	3,176,266	5,806,257	12,338,105
Ontario.....	37,874,010	87,281	21,415,710	65,114,804	114,706,799
Quebec.....	28,071,868	66,714	12,389,673	44,555,025	77,205,182
Total.....	\$77,964,020	187,942	\$40,851,009	\$124,907,846	\$221,617,773

The principal branches of manufacture for the different provinces, with the capital invested, number of hands employed, and value of products, are shown in the two following tables:

INDUSTRIES.	NEW BRUNSWICK.			NOVA SCOTIA.		
	Capital invested.	Hands employed.	Value of products.	Capital invested.	Hands employed.	Value of products.
Bakeries of all sorts.....	\$20,305	131	\$279,191	\$74,900	134	\$395,915
Blacksmithing.....	114,090	866	512,930	156,276	1,226	592,713
Boots and shoes.....	163,420	1,187	976,457	247,729	1,313	1,057,539
Cabinet and furniture.....	48,656	174	162,951	233,580	315	252,460
Carding and fulling mills.....	63,096	142	232,183	77,610	193	274,839
Carpenters and joiners.....	27,883	211	131,910	115,126	516	273,103
Carriage making.....	87,602	472	308,634	87,665	428	204,023
Cooperage.....	4,241	261	88,707	27,830	548	131,099
Cotton factories.....	125,000	127	160,600	.....	.....	.....
Dress making and millinery.....	7,733	268	195,396	9,635	217	156,882
Fittings and foundry working in brass, iron, lead, &c.....	32,600	82	119,000	34,000	59	55,250
Flour and grist mills.....	328,258	311	1,049,355	342,064	416	1,073,054
Foundries and machine working.....	314,200	650	602,095	307,050	455	484,122
Gas works.....	250,345	35	66,020	369,000	41	116,514
Iron smelting furnaces and steel making.....	.....	.....	.....	300,000	220	100,000
Meat curing.....	15,419	61	144,473	8,875	31	32,241
Nail and tack factories.....	72,500	118	344,000	95,500	22	33,500
Preserved articles of food.....	41,866	279	139,852	35,700	231	110,369
Printing offices.....	99,600	220	190,690	177,950	252	324,400
Quartz crushing mills.....	.....	.....	.....	427,200	303	212,998
Rolling mills.....	70,000	75	100,000	.....	.....	.....
Rope and twine making.....	20,900	63	79,700	30,000	75	120,000
Saddle and harness making.....	41,795	155	143,001	43,950	143	104,414
Sash, door, and blind factories.....	45,768	167	106,944	68,780	99	179,850
Saw mills.....	2,843,108	7,134	6,575,759	955,220	2,558	1,397,937
Ship material making.....	31,090	117	540,791	123,293	146	150,455
Ship yards.....	169,210	1,364	1,086,714	299,425	2,058	1,634,920
Soap and candle making.....	10,100	25	107,000	17,575	24	103,710
Tailors and clothiers.....	70,886	1,072	826,831	131,276	579	427,881
Tanneries.....	238,930	341	596,722	347,344	547	769,993
Tin and sheet-iron working.....	30,968	148	113,418	41,820	133	127,565
Tobacco working.....	2,750	64	26,500	53,000	261	288,500
Wool cloth making.....	52,100	97	126,700	71,800	104	99,752

INDUSTRIES.	ONTARIO.			QUEBEC.		
	Capital invested.	Hands employed.	Value of products.	Capital invested.	Hands employed.	Value of products.
Agricultural implements.....	\$821,242	2,143	\$2,291,989	\$278,660	878	\$382,582
Bakeries of all sorts.....	466,462	1,239	2,983,740	492,864	1,160	3,283,623
Blacksmithing.....	512,070	4,810	2,729,760	638,202	3,811	1,529,053
Boiler making.....	84,800	179	274,150	12,000	40	37,000
Bookbinding.....	78,820	365	853,953	93,655	197	181,433
Boots and shoes.....	1,016,087	6,854	5,025,455	1,839,417	9,865	9,074,187
Breweries.....	849,640	536	1,198,919	626,500	842	816,980
Brick and tile making.....	212,918	1,989	577,904	173,882	701	293,233
Broom and brush making.....	60,284	335	813,829	54,763	136	151,011
Cabinet and furniture.....	1,203,501	2,769	2,306,076	564,103	1,108	859,491
Carding and fulling mills.....	280,650	338	539,857	826,606	546	1,206,915
Carpenters and joiners.....	265,093	1,792	1,284,047	371,555	2,889	2,082,285
Carriage making.....	1,162,237	4,750	8,078,841	522,015	2,118	1,257,736
Chemical establishments.....	129,900	55	207,100	336,000	137	608,150
Cheese factories.....	355,279	909	1,454,702	40,425	77	123,961
Cooperage.....	272,779	1,587	1,281,868	145,684	796	820,989
Cordial and sirup manufactories.....	28,724	86	65,123	101,635	71	498,830
Cotton factories.....	457,000	495	492,200	50,000	123	129,000
Distilleries.....	657,200	421	3,875,757	80,000	45	210,000
Dress making and millinery.....	276,777	2,126	1,350,483	210,723	1,266	882,918
Edge tool manufactories.....	83,925	228	204,405	57,175	101	157,870
Engine building.....	417,000	508	671,000	247,900	457	883,525
Fittings and foundry working in brass, iron, lead, &c.....	86,932	191	191,056	303,880	659	528,062
Flour and grist mills.....	5,797,853	2,759	27,115,796	3,461,723	1,506	9,897,714
Foundries and machine working.....	2,403,480	4,686	4,631,850	735,775	1,862	1,607,461
Furriers and hatters, &c.....	145,875	550	513,189	993,403	1,255	2,302,971
Gas works.....	965,900	113	263,206	895,400	110	304,460
Glass works.....	22,000	98	112,330	114,120	220	180,800
India-rubber factories.....	600	2	7,000	454,000	492	495,615
Iron smelting furnaces and steel making.....	.....	.....	.....	192,000	404	198,000
Jewellers and watch makers.....	73,405	235	210,183	123,772	154	175,354
Lime kilns.....	64,197	1,099	265,883	38,695	758	166,346
Match factories.....	4,565	41	14,660	97,825	1,052	202,897
Meat curing.....	337,525	661	3,193,122	57,506	88	429,716
Musical instrument making.....	147,100	837	496,012	25,400	60	77,650
Nail and tack factories.....	8,000	16	22,000	266,050	494	747,880
Oil refineries.....	524,940	433	2,845,669	100,000	61	249,000
Pail and tub factories.....	.....	.....	.....	73,550	114	172,754
Paint and varnish works.....	9,700	6	12,700	48,450	25	198,200
Painters, glaziers, &c.....	27,571	279	208,304	28,548	111	80,166
Paper manufactories.....	357,900	344	487,500	225,500	384	537,376
Pot and pearl asheries.....	116,946	598	391,655	38,470	347	123,635
Potteries.....	63,772	207	186,405	31,396	108	99,814
Printing offices.....	981,060	1,784	1,907,067	900,050	1,241	998,045
Railway car factories.....	36,000	60	204,000	60,000	80	264,000
Rolling mills.....	170,090	425	1,180,000	200,000	262	400,000
Rope and twine making.....	40,160	138	185,740	69,600	169	434,400
Saddle and harness making.....	384,486	1,773	1,645,398	161,635	596	572,508
Salt works.....	203,100	175	119,999	.....	.....	.....
Sash, door, and blind factories.....	553,505	1,548	1,546,898	299,241	705	1,174,949
Saw mills.....	7,382,654	13,851	12,733,741	4,859,607	11,848	9,548,510
Scutching mills.....	93,800	480	259,653	14,482	79	10,165
Sewing machine factories.....	174,200	711	790,560	172,200	255	382,904
Shingle making.....	345,153	1,541	662,608	68,877	674	105,599
Ship material making.....	16,000	40	49,745	62,000	69	111,280
Ship yards.....	184,000	460	359,212	481,790	2,164	1,851,416
Soap and candle making.....	95,450	154	524,720	156,696	98	588,423
Starch factories.....	114,000	63	216,184	7,000	9	6,500
Stone and marble establishments.....	99,610	577	459,891	76,519	466	490,783
Straw works.....	60,305	374	154,250	205,000	294	384,000
Sugar refineries.....	.....	.....	.....	400,000	349	4,068,750
Tailors and clothiers.....	998,313	6,248	5,425,464	521,928	3,193	2,665,699
Tanneries.....	1,013,745	1,584	3,420,218	1,056,147	1,735	4,897,999
Tin and sheet-iron working.....	456,142	1,251	1,827,276	260,286	819	824,879
Tobacco working.....	124,905	707	693,387	392,490	1,184	1,426,656
Trunk and box making.....	39,750	165	201,740	52,553	283	282,300
Wool cloth making.....	2,254,706	3,696	4,589,119	398,208	556	691,978

SUPPLEMENT TO VOLUME XII.

MUSEUM OF NATURAL HISTORY

MUSEUM OF NATURAL HISTORY, The American, an institution in the city of New York for the collection of geological and zoölogical specimens and other objects of scientific interest, for the instruction of the people, and open to public inspection. The present building forms only a small portion of the structure contemplated, which it is expected will ultimately cover the whole space bounded by Eighth and Ninth avenues and 77th and 81st streets, enclosing four quadrangles, and surmounted by a dome with a diameter of 120 ft. The structure at present completed, 200 ft. in length, is built in a modern Gothic style, and has three stories, connected by a stairway in a tower at the end, and a basement. The museum was opened to the public on Dec. 22, 1877. The germ of the enterprise was the purchase of the Verreaux collection of specimens of natural history in 1868. About this nucleus accessions were gathered, until the whole collection has become very extensive and valuable. It was kept in the arsenal in Central park until its present repository, a fire-proof structure, was provided for it at the expense of the city. The different collections illustrate several different branches of science. To the Verreaux collection the Maximilian collections were added early. The Jay collection of shells, presented by Miss Wolfe, is a more recent acquisition. So also is the exceedingly valuable Hall collection, containing 7,000 types covering the whole range of American geology and mineralogy, well arranged for reference. It contains valuable fossil specimens from western North America. The Holmes collection of geological specimens was made in South Carolina. The collection of stuffed animals is extensive: among the rare and nearly extinct species represented are the aurochs, the great auk, and the Labrador duck. There are several groups of objects illustrative of anthropology: such are an interesting collection of weapons and articles of dress and ornaments from the South Sea islands; the De Morgan collection of prehistoric implements illustrative of the stone age, which was made in France, near Amiens, and including a number of arti-

NEBRASKA

cles from the Swiss lake dwellings; another collection of prehistoric relics, of later date, from Denmark; also the Davis, Haines, Jackson, Steward, and Jones collections of stone implements found in America, and other Indian productions of ethnographical interest.

MUSGRAVE, George, an English author, born in London in 1798. He was educated at Oxford, travelled extensively on the continent, and became curate of All Souls, Marylebone, and afterward rector of St. Peter and St. Paul, Borden. He has published "The Interpreter of the Four Gospels," specially adapted to the laboring population of the agricultural districts, among whom it has had a wide circulation, and several books for the children of the same class, the best known of which is "The Bird-Scarer." More lately he has published several books of travel in France, illustrated by himself, including "The Parson, Pen, and Pencil" (3 vols., 1847); "A Ramble in Normandy" (1855); "A Pilgrimage into Dauphiné" (1857); "Byroads and Battle Fields in Picardy" (1861); "Nooks and Corners of Old France" (1867); and "A Ramble into Brittany" (1870). He was the first to render the Hebrew psalter into English blank verse (1833), and has published a blank-verse translation of the Odyssey (1865).

NEAL, David, an American painter, born in Lowell, Mass., in 1837. He studied at the royal academy of Bavaria, with his father-in-law the chevalier Ailmüller, and finally under Piloty. Since 1861 he has resided in Munich. At first he painted interiors, among which were "The Chapel of the Kings, Westminster Abbey," and "St. Mark's, Venice;" but since 1870 he has devoted himself entirely to figure pieces. These include "The First Meeting of Mary Stuart and Rizzio" (which in 1876 received the great medal of the Bavarian academy), "Return from the Chase," "James Watt" (in the national gallery, London), "The Burgomaster," and a few ideal heads and portraits.

NEBRASKA. The population of the state in

1880 was 452,402, of whom 249,241 were males, 203,161 females, 354,988 natives, 97,414 foreign, 449,764 whites, 2,385 colored, 18 Chinese, and 235 Indians.—The chief agricultural productions were 1,744,686 bushels of barley, 65,450,135 of corn, 6,555,875 of oats, 424,348 of rye, 13,847,007 of wheat, 785,433 tons of hay, 2,150,893 bushels of potatoes; number of horses, 204,864; 19,999 mules and asses, 7,234 working oxen, 161,187 milch cows, 590,129 other cattle, 199,453 sheep, 1,241,724 swine; value of manufactures, \$12,627,336.—Gov. Nance, in his message to the legislature of 1883, says: "At the date of admission into the Union, in 1867, the population of Nebraska was estimated at 70,000, and the aggregate valuation of taxable property of the state was \$20,-115,252. The population at the present time, as estimated on the basis of a moderate increase over the census of 1880, is not less than 600,000. The total assessed value of property as shown by the grand assessment roll of 1882, on file in the office of the state auditor, is \$98,-537,475 11." The receipts and disbursements of the treasury for the two years ending Nov. 30, 1882, as shown by the treasurer's report, were as follows:

Balance in treasury, Nov. 30, 1880.....	\$348,018 61
Receipts from all sources during the two years ending Nov. 30, 1882, including transfers. ...	1,943,807 64
Total amount	\$2,296,826 25
Disbursed during same period, including transfers.....	1,814,211 75
Balance on hand, Nov. 30, 1882	\$472,114 50

The bonded indebtedness of the state is:

Relief bonds due in 1885	\$50,000 00
Funding bonds due in 1897	449,267 35

Total.....\$499,267 35

The aggregate valuation of property assessed for taxation in 1881, as shown by the auditor's report, was \$93,142,456 99, and in 1882, \$98,-537,475 11. The rates of levy, and amounts that will accrue to the state on the assessment of 1882, are as follows:

General fund, $4\frac{1}{2}$ mills.....	\$437,874 44
Sinking fund, $\frac{1}{4}$ mill.....	23,726 15
School fund, 1 mill.....	98,537 47
University fund, $\frac{3}{8}$ mill.....	36,951 56

Total.....\$597,089 62

The number of acres of educational lands held by the state, Nov. 30, 1882, was 2,582,-366-65. Of this amount 217,080 acres have been sold but not deeded, 489,440 have been leased, leaving 1,872,846-65 acres subject to sale or lease. During the two years preceding the above date 274,699-70 acres were leased at an estimated aggregate valuation of \$824,-099 10. During the same period 88,627 acres were sold for the sum of \$657,971 42, being an average of \$7 42 per acre. The school attendance in 1882 was 115,546, an increase of 14,770 over the number in attendance the previous year. The total value of school property is estimated at \$2,054,049 18. The permanent school fund is \$2,262,687 44. The state normal

school had 318 students in 1882.—On the 30th of November, 1880, there were 193 patients in the hospital for the insane. During the two years following, 288 were received, 165 discharged, 1 escaped, and 42 died, leaving 273 in the hospital Nov. 30, 1882. The average cost per capita per week of maintaining the inmates of the asylum, during the past two years, has been \$3 24 $\frac{1}{2}$. An additional building in connection with the institute for the deaf and dumb has been completed, and is now partly occupied. The total number of pupils in attendance is 120, an increase of 24 over the number reported two years ago. The average cost per capita per week of maintenance of inmates has been \$3 29. In the institute for the blind, the number enrolled is 25. The average cost per capita per week of maintaining the inmates during the past two years has been \$5 33. A state reform school, at Kearney, was formally opened in June, 1881. The number of prisoners reported by the warden of the state prison on the 30th of November, 1882, was 261. Of these, 3 were United States prisoners, 7 were from New Mexico, and 39 from Wyoming, leaving 212 that were state convicts, an increase of only 6 over the number reported two years previously. The legislature of 1881 provided for the erection of a home for the friendless.—By an act of Congress approved March 28, 1882, the northern boundary of the state of Nebraska was extended so as to include all that portion of the territory of Dakota lying south of the 43d parallel of north latitude, and east of the Kaya-paha river, and west of the main channel of the Missouri river, subject to the provision that the act aforesaid shall not take effect so far as jurisdiction is concerned until the Indian title has been extinguished and the state of Nebraska shall have assented to the provisions of said act.—The population of the principal places, by the census of 1880, was: Omaha, 30,518; Lincoln, 13,003; Nebraska City, 4,183; Plattsmouth, 4,175. See map in supplement to volume XI.

NEBULÆ. The general catalogue of nebulae and clusters of stars of Sir John Herschel, published in 1864, contained 5,079 numbers. This has been continued by Dr. Dreyer of the Dublin observatory up to 1879, and his highest number is 6,251. That is, there are nearly as many nebulae and clusters known as double stars.—The distribution of the true nebulae has been studied by Proctor, and they are shown to lie in the greatest number about the poles of the milky way, and in a general way their number diminishes as we approach that circle. With clusters (and fixed stars in general) the rule is precisely the reverse.—D'Arrest and others, notably Huggins, Vogel, and Copeland, have investigated the spectra of nebulous stars and nebulae. Only about 150 of the 6,000 known nebulae, or $\frac{1}{40}$ part, have been spectroscopically examined. Of these, about three fourths give a continuous spectrum and are probably distant star clusters: one forth are true gaseous nebulae.

læ. These have a characteristic spectrum of three stronger lines, of wave lengths of about 5,004.0, 4,956.6, and 4,860.6, with a fainter line sometimes present. Bredichin gives these wave lengths from his late observations at Moscow as 5,003.9, 4,957.9, and 4,859.2.—Several attempts have been made to determine the parallax of nebulae. At present we have no certain knowledge that they are not bodies comparatively close to our own system. The common notion of their great distance is an inherited one, and depends simply upon the fact that but little is known about them. Dr. Bredichin, director of the Moscow observatory, investigated in 1876 the parallax of the planetary nebula H. iv. 37, with the result that the nebula is probably at the same distance from us as the small stars near it; that is, it is probably extremely distant. Dr. Brünnow of Dublin finds for its parallax $+0.047'' \pm 0.030''$. This result indicated that this nebula is no further distant than the pole star, for example.—Dr. Winnecke, director of the observatory of Strasburg, has called attention to a periodical variation of the brightness of the nebula H. ii. 278. From 1785 to 1827 it belonged to the class of "pretty bright" nebulae, as proved by the observations of the two Herschels; from 1856 to 1865 it was "very faint," and from 1868 to 1877 it was again "pretty bright." Another case of the same sort is pointed out by Winnecke.—The 26-inch equatorial telescope at Washington has been lately employed by Prof. Holden in the examination of several of the more important nebulae. Two in particular have been carefully studied, and the observations compared with previous ones, with the result of finding strong evidence of changes going on in these nebulae. The great nebula of Orion was studied during 1874-'9, and the results compared with all previous observations since 1656. In a few portions of this nebula there has undoubtedly been a change of form or brightness, or both. The great number of drawings and measures available in the latter case makes the conclusions more certain.—Prof. Holden has published (in the Washington observations for 1878) the result of these important researches in an exhaustive monograph on the nebula of Orion. The comparison of the numerous carefully studied drawings there given, however, leads us to the conclusion that the difficulties of depicting objects which have no definite outline, or even form, and which pass everywhere by insensible gradations into invisibility, prove too great, even with the utmost care, to promise any large increase of our present knowledge by the old means. Within a time still more recent, however, an advance has been made, by another method, which has surpassed every expectation. It had long been recognized that photography would be invaluable here, but it was supposed that it could not be used on objects so faint and diffuse. In September, 1880, Dr. Henry Draper obtained, for the first time, a photo-

graphic view of a nebula (the one in question), which, however, comprised its brightest parts only. In 1882 a very great improvement on this former work had been achieved by him, when his lamented death put an end to researches in which, while he lived, he had no rival. Since then (in 1883) a photograph of the nebula has been obtained by Mr. Common, of Eating, England (using his three-foot reflecting telescope), which surpasses anything done before. The exposure lasted thirty-nine minutes, and the detail gathered in this time is fuller and its topography incomparably more accurate than all we owe to all previous eye-sketches united. In both Dr. Draper's and Mr. Common's pictures the faintest telescopic stars are indicated, and, as there appears to be no ascertainable limit to the sensitiveness of the plate, the remarkable anticipation of Draper appears in a fair way to be realized, and we may reasonably hope that photography will, ere long, seize details which are so faint that they are absolutely invisible. Photography has also been recently applied to the excessively feeble spectra of nebulae, so as to show details which are invisible from another cause. Dr. Huggins (in 1882) has obtained a photograph of this same nebula, not only showing the four bright lines first seen by him in 1864, but adding to these a fifth, which, though very strong, had remained undiscovered, owing to its lying beyond the range of vision, in the ultra-violet. The planetary nebulae are frequently so small as to elude the discovery of their true nature, though they may be visible in the telescope as faint stars. Prof. Pickering of the Harvard college observatory has proposed and successfully applied a new method for their search, which consists in arming the telescope with a spectroscopic eyepiece, seen through which all true stars appear drawn out into trails of light, while if a planetary nebula be present it is recognizable by its comparatively unaltered appearance.

NEBULAR HYPOTHESIS. In a series of four memoirs presented to the royal society, Mr. G. H. Darwin has investigated the changes which would be produced in the configuration of a planet and its (one) satellite under the influence of tidal friction, proving that frictional tides in the earth are causing and must have caused such changes. The following have been the principal changes: 1. The lunar period must have been shorter in the past, and may be traced back from the present 27.3 days, until initially the moon revolved round the earth in from two to four hours. 2. Formerly the inclination of the lunar orbit must have been 6° or 7° ; it is now $5^\circ 9'$; initially it was very small, or zero, the 7° being a maximum. 3. The inclination and the eccentricity of the orbit have also changed. In the case of the earth, which now rotates in 24 hours, and the "proper plane" (*i. e.*, the mean equator) of which is inclined $23^\circ 28'$ to the ecliptic, frictional tides have caused the following changes: 1. The day was for-

merly much shorter; initially it was two to four hours, and the same as the moon's period. 2. The inclination of the earth's true equator to the "proper plane" was formerly a maximum $2^{\circ} 45'$, and initially it was very small, or zero. 3. Initially the inclination of the "proper plane" to the ecliptic was about $11^{\circ} 45'$, instead of $23^{\circ} 28'$; it was then identical with the lunar orbit. Changes of detail may be made in the foregoing conclusions, according to the nature of the tides in the earth; but it is considered most probable that the more recent changes, at least, have been due to oceanic tidal friction, and that the more remote were caused by bodily tidal friction. These conclusions exhibit the earth and moon initially very nearly in contact, the moon always opposite the same face of the earth, or moving very slowly relatively to the earth's surface, the whole system rotating in from two to four hours about an axis inclined about $11^{\circ} 45'$ to the axis of the ecliptic, and the moon moving in a circular orbit in the plane of the earth's equator. These conclusions suggest that the moon was formed by the rupture of a primeval planet whose mass was composed of the present earth and moon. This is a considerable modification of Laplace's hypothesis, and is more like that given by Swedenborg in his original announcement of the hypothesis. It throws considerable light on the rapid motion of the inner satellite of Mars.

NEILSON, Lilian Adelaide, an English actress, born near Saragossa, Spain, March 3, 1850, died in Paris, Aug. 15, 1880. She was taken when quite young to Paris, and in 1862 to London. In 1865 she appeared as Julia in "The Hunchback" at the Theatre Royal, Margate. In 1871 she made her debut in London at the Royalty theatre as Juliet. She played in various theatres in London, as Gabrielle de Savigny (a character which she performed 130 times), Victorine, and Nelly Armroyd; in Edinburgh as Rosalind and as Pauline in the "Lady of Lyons"; and in Birmingham in the "Captain of the Vulture." In 1869 she returned to London, and in March assisted at the first performance of "Life for Life," in the character of Lilian. The same year she appeared at the Gaiety theatre in the first performance of two plays: in October as Mme. Vidal, the leading rôle in "A Life Chase," and one which she played 173 times; and in December as Mary Belton in "Uncle Dick's Darling." In September, 1870, she appeared at Drury Lane in her original character Amy Robsart, and was received with enthusiasm. In the following December, at the same theatre, she appeared as Juliet, the character in which she made her debut in London, and the one in which she shone to the highest advantage. In 1871 she made a starring tour through Great Britain, acting principally in Amy Robsart, and returned in September to Drury Lane and took the part of Rebecca in the first representation of a drama founded on Scott's "Ivanhoe." In September, 1872, at the Queen's theatre, Long Acre, she gave several farewell performances,

previous to departing for the United States. In November she appeared at Booth's theatre, New York, in Juliet, and was enthusiastically received. In her tour through the country she played all her favorite characters (adding Beatrice, Lady Teazle, and Isabella to those already mentioned) with extraordinary success. She returned to Europe in the summer of 1874, but made a short visit to America in 1875. In January, 1876, she reappeared on the Haymarket stage, where she played Anne Boleyn. In 1877 she spent eight months in the United States, when she appeared as Viola in "Twelfth Night" and Imogene in "Cymbeline." She terminated an engagement at the Haymarket in May, 1878, and in February, 1879, appeared at the Adelphi theatre as Queen Isabella at the first performance of the "Crimson Cross," and again during the following summer, in several characters. In October, 1879, she again left England for America, where she made an extensive tour, and in April, 1880, played a round of her principal characters at Booth's in her farewell engagement. In 1872 Miss Neilson was married in England to Philip Lee, from whom she procured a divorce in New York in 1877.

NEVILLE, Alphonse de, a French painter, born at St. Omer in 1836. Intending to join the army, he entered the preparatory school of Lorient, where the professor of design discovered his skill in drawing. In accordance with the wishes of his family, he entered the law school in Paris, but spent most of his time at the military school and wherever he could see anything of military life. Finally declaring that he would be nothing but a painter, he opened a studio in Paris. He had applied for instruction to several artists, all of whom discouraged him except Delacroix, with whom he became intimate. His first picture, "The Gervais Battery," took a medal at the salon of 1859. The next year he was commissioned to paint "The Taking of Naples by Garibaldi," but the picture was considered a failure. In 1861 he received another medal for "Chasseurs of the Guard," and since then he has devoted himself almost entirely to the painting of military subjects, though for a time he worked as an illustrator of books. His best known works are "Attack in the Streets of Magenta," "The Chasseurs crossing the Tchernaya on Foot" (in the museum of Lille), "Bivouac of Bourget" (at Dijon), "The Last Cartridges at Balan," "An Episode in the Battle of Forbach," "A Surprise in the Environs of Metz," "An Engineer Officer on a Reconnaissance," and "The Attack by Fire on a Barricaded House at Villersexel," which is considered his masterpiece.

NEVADA. The population of the state in 1880 was 62,266, of whom 42,019 were males, 20,247 females, 36,613 natives, 25,653 foreign, 53,556 whites, 488 colored, 5,419 Chinese, 2,803 Indians.—The chief agricultural productions were 513,470 bushels of barley, 12,891 of corn, 186,860 of oats, 69,298 of wheat, 95,853 tons

of hay, 302,143 bushels of potatoes; value of farms, \$5,408,325; of live stock on farms, \$3,399,749; estimated value of all farm productions, \$2,855,449; number of horses, 32,087; 1,258 mules and asses, 765 working oxen, 13,319 milch cows, 158,137 other cattle, 133,695 sheep, 9,080 swine; value of manufactures, \$2,179,626; gold mined, \$4,888,242; silver, \$12,430,667; 734,730 lbs. of ingot copper. The yield of precious metals has largely diminished in the past few years, owing chiefly to the giving out of the Comstock lode.—The public debt of Nevada is \$336,587 50, and the state has \$331,127 03 in coin on hand. The receipts for 1881 and 1882 amounted to \$302,435 74 and \$303,445 94 respectively; the expenditures, to \$346,117 01 and \$286,842 66, leaving for the two years in the treasury a cash balance of \$27,868 99. The aggregate valuations of assessable property in the state, for 1882, amounted to \$29,109,889 86, which sum included the net proceeds of mines. With reference to these the decrease for 1882 was principally in the counties of Esmeralda, Eureka, and Lander, to a total amount of \$801,817 11, making an aggregate decrease of assessable valuations in the state of \$1,799,720 41, as compared with those for 1881.—The assets of the state school fund amount to \$622,008 85, of which sum \$576,610 50 are invested in undoubted securities. The whole number of children of school age, from 6 to 18 years, throughout the state, at the close of 1882, was 10,483. The money apportionment made for them by the superintendent of public instruction, in his semi-annual report for the first half of 1883, amounts to a total of \$30,354 40, or at the rate of little less than \$6 a year for each child. The state university fund amounts to \$56,630, invested in undoubted securities, as the school fund. The expense of keeping this university open the governor thinks to exceed by much the benefits resulting from it.—The Nevada asylum for the insane, constructed and furnished at the cost of \$63,000, was put into operation in 1882. The number of insane persons in Nevada, brought from the asylum at Stockton on July 1, 1882, and lodged in the asylum erected for them at Reno, was 148.—In the state penitentiary the number of convicts on Jan. 1, 1881, was 138, increased soon after to 162, and then, in the course of two years, gradually diminished, their number on Dec. 31, 1882, being 113. The cost to the state for feeding, clothing, and guarding each prisoner during the two biennial terms of 1879-'80 and 1881-'2, has been 72'35 and 66'96 cents per diem, respectively. At the session of 1879, the legislature appropriated \$100,000 for current expenses of the state prison, and \$60,000 for its boot and shoe manufactory, in which occupation the convicts are almost exclusively employed. During the two years 1881-'2 there were from this factory \$1,995 86 of profits, with about \$600 of bad debts. Out of the proceeds from the sales of boots and shoes manufactured at the Nevada peniten-

tiary within the said two years, the warden paid into the state treasury \$55,836 69.—The population of the principal places, by the census of 1880, was: Virginia City, 10,917; Gold Hill, 4,531; Carson City, 4,229; Eureka, 4,207. See map in supplement to volume III.

NEW HAMPSHIRE. The population of the state in 1880 was 346,991, of whom 170,526 were males, 176,465 females, 300,697 natives, 46,294 foreign.—The chief agricultural productions were 77,877 bushels of barley, 94,090 of buckwheat, 1,350,248 of corn, 1,017,620 of oats, 34,638 of rye, 169,316 of wheat, 583,069 tons of hay, 170,843 lbs. of tobacco, 3,358,828 bushels of potatoes; number of horses, 46,773; 29,152 working oxen, 90,564 milch cows, 112,689 other cattle, 211,825 sheep, 53,437 swine; value of manufactures, \$73,978,028.—There were 2,552 public schools, including 51 high schools; expended for school purposes, \$568,103; pupils enrolled, 64,670; average attendance, 48,943.—The state debt is as follows:

Net indebtedness June 1, 1881.....	\$3,372,770 05
June 1, 1882.....	3,330,757 48
Reduction during the year.....	\$42,013 57
Receipts from all sources during the year.....	909,603 90
Cash on hand June 1, 1882.....	87,507 37
Total receipts during the year.....	\$947,116 27
Expenditures for all purposes during the year...	885,894 79
Cash on hand June 1, 1881.....	61,111 48
Total.....	\$947,116 27

The ordinary state expenditures during the last fiscal year amounted, in the aggregate, to \$201,492 80; the extraordinary to \$59,441 41. This sum includes large items of outlay of no frequent occurrence.—The taxes assessed upon the railroads for 1881 amounted to \$170,003 85; upon the telegraph companies, \$867 73. The valuation of the railroads for assessment purposes has been reduced this year to \$82 on \$100 of supposed actual value; and that has been the average rate of their taxation throughout the state. The aggregate amount of railroad tax for 1882 is about \$13,000 less than in 1881, because of the said undervaluation, and because the lower rate of taxation has now been assessed on other property within the state generally.—The land and water areas of New Hampshire have been ascertained from accurate measurements as follows: The total land area of New Hampshire, by counties, in square miles, is Rockingham, 740; Strafford, 320; Belknap, 400; Carroll, 780; Merrimack, 920; Hillsborough, 980; Cheshire, 780; Sullivan, 580; Grafton, 1,525; Coos, 1,980 = 9,005. Water area of the state, 300. Total gross area, 9,305 square miles.—The taxable property in 1881 was valued at \$200,878,016; taxes levied, \$3,111,007. The live stock returned was as follows: 59,447 horses, valued at \$3,389,790; 26,751 oxen, \$1,258,120; 96,574 cows, \$2,226,486; 63,142 other cattle, \$1,024,946; 229,049 sheep, \$650,175. There were 64 savings banks, with 96,881 depositors

and \$32,097,734 17 deposits.—The population of the principal places, by the census of 1880, was: Manchester, 32,630; Concord, 13,843; Nashua, 13,397; Dover, 11,687; Portsmouth, 9,690; Keene, 6,784. See map in supplement to volume V.

NEW JERSEY. The population of the State in 1880 was 1,131,116; of whom 559,922 were males, 571,194 females, 909,416 natives, 221,700 foreign, 1,092,017 whites, 38,853 colored.—The chief agricultural productions were 466,414 bushels of buckwheat, 11,150,705 of corn, 3,710,573 of oats, 949,063 of rye, 1,901,739 of wheat, 518,990 tons of hay, 172,315 lbs. of tobacco, 3,563,793 bushels of Irish and 2,086,731 of sweet potatoes; number of horses, 86,940; 9,267 mules and asses, 2,022 working oxen, 152,078 milch cows, 69,786 other cattle, 117,020 sheep, 219,069 swine; value of manufactures, \$254,380,236; iron ore mined, 754,872 tons; zinc ore, 39,381 tons; value of fishery products, \$3,176,589.—The amount of state school tax in 1882 was \$1,342,656, an increase of \$19,916 over 1881; district and city tax for teachers' salaries and current expenses, \$275,932 45, an increase of \$162 04; district and city tax for permanent improvements, \$366,332 95; from other sources, including state appropriation, interest of surplus revenue, and township school tax, \$157,463 34; the total amount appropriated for maintaining the schools was \$1,776,057 79, and, including the sum voted for building and repairing school houses, the total amount for educational purposes was \$2,142,384 74, an increase over the amount appropriated in 1881 of \$21,534 18. The total value of school property is \$6,270,778, showing a decrease of \$4,289 from 1881. The number of pupils enrolled in 1882 was 209,526; average attendance, 113,532.—The financial transactions of the state are kept by the treasurer under four general accounts, viz.: agricultural college fund, library fund, school fund, and state fund. The income of the agricultural college fund is derived from the interest on \$116,000 of state bonds, purchased with the proceeds of the sale of lands given by the general government. It amounts to \$6,960, and is paid over to the agricultural college. The state library fund is small. The treasurer includes in the operations of the school fund the amount received by him as the result of the State school tax, but the whole of this amount is returned to the several counties. Under the law of 1881 the rate of the school tax was changed from two mills on the dollar of property to four dollars for each child between 5 and 18 years of age. The sum produced was to be paid into the treasury on the 1st of January; 90 per cent. of it was to be returned within ten days to the counties paying it, and the remaining 10 per cent. was to be distributed by the state board of education, according to their discretion, among the several counties.

The amount produced by this tax and paid into the treasury was.....	\$1,322,740 00
And for the preceding year, under the former system.....	1,017,784 68
Increase.....	\$304,955 32

The assets of the school fund at the close of the fiscal year embrace railroad stocks and bonds, United States bonds, state and city bonds, bonds of school districts, bonds and mortgages and other items, as follows:

Railroad and bank stock	\$46,500 00
United States bonds.....	553,000 00
Railroad bonds.....	117,000 00
State and city bonds.....	85,000 00
Bonds of school districts.....	96,100 00
Bonds and mortgages.....	999,508 50
Principal of riparian leases.....	1,124,119 58
Real estate bought at foreclosure.....	62,000 00
	\$3,055,228 08
Interest due on bonds and mortgages.....	52,616 73
Rents due on riparian leases.....	67,118 22
Balance on hand.....	201,764 29
Total property of the fund	\$3,376,727 27
Total property Nov. 1, 1881.....	2,599,653 00
Increase during the year.....	\$477,069 27

The receipts of the fund during the year were \$172,427 64. The disbursements were:

Appropriation to public schools.....	\$100,000 00
Amount invested.....	872,200 00
Premium on United States bonds purchased....	8,125 00
Cash on hand Oct. 31, 1882.....	201,764 29
	\$677,089 29

The assets of the state fund are as follows:

Stock of the joint companies.....	\$288,700 00
Bonds of the joint companies.....	24,000 00
	\$312,700 00
Besides these there are held centennial stock (valueless).....	74,116 67
County bonds, securing surplus revenue, loaned.	764,670 44
Total.....	\$1,151,487 11

The following table presents an exhibit of the receipts and expenditures of the years 1881 and 1882:

RECEIPTS.	1881.	1882.
Tax on corporations	\$646,025 98	\$673,455 24
State tax.....	120,564 20	.....
State prison receipts.....	56,611 20	75,082 78
Interest and dividends.....	30,310 00	30,310 00
Judicial fees.....	20,313 21	17,594 12
Official fees.....	2,793 88	11,755 52
Sales of revision.....	880 00	825 00
Fines and forfeited recognizances.....	629 50	4,039 13
Licenses and fees.....	615 00	500 00
Fees returned.....	.....	7,521 29
Sales of ordnance.....	.....	1,439 39
Assessments on private acts.....	.....	50 00
Total receipts.....	\$878,747 87	\$923,525 47
Balance at beginning of year.....	384,730 45	167,274 39
Temporary loan.....	.....	250,000 00
Total.....	\$1,263,478 32	\$1,240,799 86
Total disbursements.....	\$1,096,203 93	\$1,104,303 75
Balance at close of year.....	167,274 39	136,496 11
Total.....	\$1,263,478 32	\$1,240,799 86

The disbursements of the year exceeded the receipts in the sum of \$280,778 28. This ex-

cess was met by diminishing the bank balance in the sum of \$30,778 28, and by borrowing \$250,000.—The business of the riparian commission during 1882 was much more than double that of the preceding year. These grants and leases have been made in every county of the state fronting on tide-waters. The lands still in the possession of the state are of great value, particularly in the bay of New York, and on the Hudson and Delaware rivers. The operations of the commissioners during the year were as follows:

Grants of the fee	\$210,152 28
Leases converted into grants	33,275 50
Leases made at a rental of 7 per cent.	197,820 08
Total	\$441,247 86
Received on leases heretofore made	65,202 45
Total	\$506,450 31

The following is the valuation of the ratables in the several counties of the state:

	Valuation.
Atlantic	\$4,577,238 00
Bergen	16,097,571 00
Burlington	25,856,143 00
Camden	19,217,640 00
Cape May	3,525,265 00
Cumberland	12,111,000 00
Essex	103,494,000 00
Gloucester	13,738,260 00
Hudson	91,901,996 50
Hunterdon	21,067,571 00
Mercer	29,830,820 00
Middlesex	18,326,000 00
Monmouth	27,991,000 00
Morris	21,040,447 00
Ocean	3,223,998 00
Passaic	27,953,345 00
Salem	13,396,976 00
Somerset	16,300,000 00
Sussex	9,960,557 00
Union	24,016,100 00
Warren	18,762,295 00
Total	\$527,451,222 50

—The number of convicts in the state prison at the beginning of 1882 was 803; received during the year, 454; discharged and died, 459; leaving in the prison at the close of the year, 798; being 5 less than at the close of 1881. Of this number 32 are females and 766 are males. By the report of the supervisor, the expense of maintaining the prison during the year was as follows:

Maintenance	\$62,502 80
Repairs	5,784 33
Paid discharged convicts	1,402 00
Salaries of officers and inspectors	9,000 00
Salaries of deputies	51,073 81
Total	\$129,762 94
Earnings of prisoners	65,599 67
Net loss to the state	\$61,163 27
Net loss of previous year	68,888 94

The number of inmates of the reform school for boys at the beginning of the year was 266; committed, 130; returned, 23; total, 419; 97 of these were discharged, leaving in the institution at the close of the year, 322, a marked increase. The amount of money from the state expended in the maintenance of the school was \$23,076 25; there was derived from the labor of the boys in the shirt factory, \$14,

859 92; from the sale of farm products and miscellaneous sources, \$3,499 22; and from the board of boys, \$589 06. The farm products amounted to nearly \$10,000, an increase of about \$3,600; and over 400,000 bricks were manufactured, nearly 300,000 of which were used in the construction of the new family building. The number of pupils in the industrial school for girls at the close of 1882 was 25; committed during the year, 20; returned to the school, 6; making a total of 51. For the support and care of this number, the state has invested about \$45,000. The cost of maintenance was \$6,151 72, leaving a balance on hand of \$981 55.—The state provides for the care of the insane in its institutions at Morristown and Trenton, and in the county asylums of Burlington, Camden, Cumberland, Essex, Hudson, Passaic, and Salem. Toward the support of these institutions the state pays \$1 a week for each county patient in the several asylums; and \$7 a week for each convict patient in the Trenton asylum. The counties pay \$3 a week for each patient sent to the state asylums. The reports of the managers and superintendent of the Trenton asylum show that there were in the institution at the beginning of 1882 577 patients; received during the year, 186; total, 763; of these, 77 were discharged and 57 died, leaving at the close of the year 629 patients. The receipts for the year, with the balance on hand at the beginning of the year, amounted to \$166,584 20. The expenditures were \$151,061 52, leaving a balance at the close of the year of \$15,522 68. The number of patients in the Morristown asylum at the beginning of the year was 641; received during the year, 174; discharged, 93; died, 55; remaining at the close of the year, 667. Besides the inmates of the state institutions, there were in the county asylums 746 patients, divided as follows: Essex, 328; Hudson, 222; Camden, 79; Burlington, 64; Passaic, 36; Cumberland, 10; and Salem, 7. For these the state pays \$1 per week, and the amount paid from the state treasury during the year was \$37,640 40.—It appears, from a census report of the commercial fisheries of the United States, that New Jersey produced in 1880 \$3,176,589 worth of fishery products, taking the sixth place in the list of fish-producing states. In some of the special fisheries it takes a higher rank. Its oyster products, valued at \$2,030,625, are exceeded only by those of Maryland and of Virginia. Its crab fisheries, from which the fishermen realize \$162,612, are more extensive than those of any other state, while its quahaug (hard-clam) fisheries are second only to those of New York. In the menhaden fisheries it stands fifth on the list, the oil, scrap, and compost produced in 1880 being valued at \$146,286. Its river fisheries are of minor importance, the total yield being only 2,752,000 pounds, netting the fishermen \$91,435.—The population of the principal places, by the census of 1880, was: New-

ark, 136,508; Jersey City, 120,722; Paterson, 51,031; Camden, 41,659; Hoboken, 30,999; Trenton, 29,910; Elizabeth, 28,229; New Brunswick, 17,166; Orange, 13,207. See map in supplement to volume XIII.

NEWMARKET CAVE, a cavern situated in the foot hills of the Massanutton range, in the western part of Virginia, 6 m. from Newmarket station, and 4 m. S. E. of Newmarket village. It is distant about 30 m. from Weyer's, Fountain, and Madison caves, and 16 m. from Luray cavern. It is in a fine farming country, and all the land about it is in either pasturage or tillage. The surface of the ground in the vicinity is rolling, with many of the sink holes which characterize a cavernous locality. At the time of its discovery the land at the entrance was owned by Reuben Zirkle, and the first explorations in it were made by him and his sons. The opening was found by removing a few stones from a slight depression whence a draught of air had been observed to come. In general structure it resembles Madison, Fountain, and Weyer's caves, but surpasses them in the size of its chambers and the beauty of its formations; while it differs altogether in form from Luray cavern, and is inferior to it in size and attractiveness. The descent to the first apartment is by a nearly perpendicular passage 20 ft. deep and 5 or 6 ft. in diameter. The first room is 100 ft. long and 12 ft. high. A side room, 15 ft. wide and high, with a smoothly arched ceiling, extends from this for a considerable distance. Proceeding through a long passage varying from 3 to 4 ft. in width and from 5 to 7 in height, and crossing at right angles a long, low gallery, then traversing a larger passage and making a sharp turn, the second hall is reached. This is 25 ft. wide, 200 ft. long, and from 25 to 50 ft. high, with smooth walls. Stepping then to a much lower level, a room is entered that is of a very irregular form and cumbered with enormous blocks of stone which have fallen from the roof. The course is then to a level 50 ft. higher, through an intricate system of chambers, the largest of which is 40 by 60 ft. and 15 ft. high. Descending thence over a succession of shallow basins of peculiar formation, a hall is reached that is 100 ft. long and 50 ft. wide, with a vaulted ceiling; and from this the visitor passes into a chamber 500 ft. long, 50 ft. wide, and 30 ft. high, with a floor covered with angular masses of stone. An apartment following this is 40 ft. high, 300 ft. long, and 40 ft. wide; and this is succeeded by a room 100 by 50 ft. and 15 ft. high. From this an arched passage leads to a chamber 50 by 50 ft., and 30 ft. high, in which the principal wonder of the cave is to be seen. The floor is divided by an immense fissure which extends in a semicircular form under the walls of the room into the next apartment. The chasm is 60 ft. deep, and at the bottom is a stream of pellucid water several feet in width. The next chamber is 225 ft. long, 50 ft. wide, and 40 ft. high; and following this is a hall 400 by 100 ft.

and 40 ft. high, at one end of which is a pit 15 or 20 ft. deep. Beyond this and at a higher level is a gallery formed in a perfect circle, 300 ft. or more in circumference, with a level floor and a ceiling 6 or 8 ft. high, arched with the utmost accuracy. From the bottom of the pit before mentioned a narrow crevice leads to a series of low chambers 100 ft. below the gallery. The formations in this cave comprise all of those common to Virginia caverns. The resemblances to statuary are numerous. In one of the chambers is a brown stalactite, with a figure upon it in pure white of the exact form of a mouse. The characteristic feature of the cave is the presence of a vast quantity of fine, perfectly limpid calcite crystals.

NEW MEXICO, a territory of the United States, bounded N. by Colorado, E. by the Indian Territory and Texas, S. by Texas and Mexico, and W. by Arizona; area, 122,460 sq. m. The population in 1880 was 119,565, of whom 64,496 were males, 55,069 females, 111,514 natives, 8,051 foreign, 108,721 whites, 1,015 colored, 57 Chinese, and 9,772 Indians. —The chief agricultural productions were 50,-053 bushels of barley, 633,786 of corn, 156,-527 of oats, 706,641 of wheat, 7,650 tons of hay, 21,883 bushels of Irish and 3,217 of sweet potatoes; number of horses, 14,547; 9,063 mules and asses, 16,432 working oxen, 12,955 milch cows, 137,314 other cattle, 2,088,831 sheep, 7,857 swine; pounds of wool clipped, 4,019,188; value of manufactures, \$1,284,846; gold mined, \$49,354; silver, \$892,337. There were 162 public schools; pupils enrolled, 4,755; average attendance, 3,150. The assessed value of property in the territory was \$11,363,406. —The following table shows the mileage of railroads in New Mexico at the beginning of 1882:

COMPANIES.	Miles.
Atlantic and Pacific.....	158
Atchison, Topeka, and Santa Fé.....	538
Denver and Rio Grande.....	92
Southern Pacific.....	167
Total.....	975

—The capital of New Mexico is Santa Fé, pop. in 1880, 6,635. See map in supplement to volume III.

NEWTON, Alfred P., a British painter, born in 1835. He is almost entirely self-taught, his studies being made from nature in Scotland, Wales, and Italy. Most of his works are in water-color. They include "Mountain Gloom," "Mountain Glory," "Mystery and Immensity," "Nature's Merriments," "Declining Day," "The Approach of Winter," and "Left by the Tide."

NEW YORK. The population of the state in 1880 was 5,082,871, of whom 2,505,322 were males, 2,577,549 females, 3,871,492 natives, 1,211,379 foreign, 5,016,022 whites, 65,104 colored, 909 Chinese, 17 Japanese, 819 Indians. The chief agricultural productions were 7,792,-062 bushels of barley, 4,461,200 of buckwheat, 25,690,156 of corn, 37,575,506 of oats, 2,634,-

690 of rye, 11,587,766 of wheat, 5,240,563 tons of hay, 21,628,931 lbs. of hops, 6,481,431 of tobacco, 33,644,807 bushels of potatoes; value of orchard products, \$8,409,794; number of horses on farms, 610,358; 5,072 mules and asses, 39,633 working oxen, 1,437,855 milch cows, 862,233 other cattle, 1,715,180 sheep, 751,907 swine; value of manufactures, \$1,080,696,596; tons of iron ore mined, 1,239,759; value of fishery products, \$4,380,565.—The funded debt of the state on the 30th of September, 1882, deducting an unapplied balance in the sinking fund of the canal debt, was \$6,385,356 30. Of this sum, \$122,694 87 was the amount necessary to yield, at 6 per cent. interest, the sum required to pay the annuities to Indians; \$3,000 was unclaimed bounty debt; and the remainder, \$6,259,661 43, represented the canal debt. The only change in the funded indebtedness of the state during the last fiscal year was a contribution of \$309,717 to the sinking fund. The aggregate receipts of the state treasury during the fiscal year, including a balance from the previous year amounting to \$5,531,858 71, were \$17,735,761 59; the payments during the same period amounted to \$13,898,198 21, leaving a balance in the treasury at the beginning of the new fiscal year of \$3,837,563 38. The amount received from taxes on corporations during the year was \$1,539,684 27, being an increase of \$546,959 11 over the previous year. The rate of taxation for the current fiscal year was fixed by the legislature at $2\frac{4}{10}\%$ mills on the dollar, which was estimated to yield a revenue of \$6,820,022 29. The assessed value of property is \$2,985,682,567, of which \$2,432,661,378 is real estate.—The revenues of the canals, for the year ending Sept. 30, 1882, were as follows:

Tolls	\$647,602 88
Rent of surplus water	1,910 85
Miscellaneous sources	10,456 62
Total	\$659,970 35
The expenditures amounted to	653,510 01
Leaving a surplus of	\$6,460 34

For the year ending Sept. 30, 1881, the revenue failed to meet the expenditures by the sum of \$205,642 45. The following is a statement of freight carried and tolls collected from the opening of navigation to Dec. 1st in the years 1881 and 1882:

	Tons moved.	Tolls collected.
1882	5,421,720	\$655,195 51
1881	5,143,877	631,621 11
Gain in 1882	277,843	\$23,574 45

The tolls received after Sept. 30th, with an unexpended appropriation in the canal fund, amounting together to \$588,000, were deemed sufficient for repairs until the end of the current fiscal year, after which the canals will have to be supported by taxation. Eighty-nine claims, amounting to \$168,652 57, were

filed with the board of canal appraisers during the year. During the same time 273 claims, aggregating \$866,741 58, were disposed of, the awards amounting to \$19,644 76. The cost of maintaining the board, exclusive of awards, was \$39,639 20, of which \$15,280 07 was paid to attorneys employed to defend the state against claimants.—Seventy-six banks of discount and deposit were engaged in active business under the provisions of the banking laws of the state, on the 1st day of October, 1882. On that day their condition was reported as follows:

Resources	\$122,563,460
Capital	18,505,700
Surplus and profits	9,657,702
Due depositors	82,050,980
Other liabilities	12,049,078

The increase in deposits during the year was \$6,333,850; profits, \$729,527; loans and discounts, \$5,503,379; and the net aggregate increase in assets was \$9,099,888. During the year six new banking associations were organized, one failed, and one was converted from a state to a national bank. On the 1st day of July, 1882, the number of savings banks reporting to the superintendent of the bank department was 127, of which number 11 were in process of voluntary liquidation. During the year one new savings institution was organized, and one closed, having first paid its depositors and creditors in full. The condition of the savings banks on the day named was as follows:

Resources	\$460,123,582
Due depositors	400,743,838
Surplus	59,157,039
Other liabilities	222,705
Number of open accounts	1,066,513

The increase in these several items during the year was as follows:

Resources	\$35,918,774
Deposits	30,071,541
Surplus	5,853,656
Open accounts	70,776

There were 14 trust, loan, and mortgage companies in the state, whose condition on July 1, 1882, was as follows:

Resources	\$139,758,584
Capital	12,579,500
Surplus and profits	9,854,376
Deposits	104,888,185
Other liabilities	12,486,473

This statement shows an increase over the preceding year of \$10,765,848 in deposits, \$1,322,027 in surplus and profits, and a net aggregate increase in assets of \$13,869,620.—On the 1st day of October, 1882, there were in the state 14 corporations for the safe keeping and guaranteeing of personal property, employing \$2,676,900 of capital in the aggregate.—There were 151 fire insurance companies doing business in the state on the 1st day of July, 1882, of which 69 were New York state companies, 55 were organized in other states, and 27 were foreign companies, with assets amounting in the aggregate to \$154,810,890 43;

their total liabilities, including capital stock, were \$111,423,096 62, and their net surplus \$43,387,793 81. There were 12 marine insurance companies doing business in the state on the 1st day of January, 1882, with assets amounting to \$22,888,423 93, and liabilities, including capital stock and scrip, amounting in the aggregate to \$18,183,850 69, leaving a net surplus of \$4,704,573 24. There were 12 life insurance companies organized and doing business under the laws of this state, with assets amounting in the aggregate to \$225,966,512 02; liabilities, \$187,050,970 48, leaving a surplus, as regards policy holders, of \$38,915,541 54. There were also 17 life insurance companies organized in other States, but doing business in New York, with total assets of \$203,310,947 58, and liabilities amounting to \$169,813,325 83, leaving a surplus, as regards policy holders, of \$33,497,621 75; also one foreign life insurance company, with total assets in the United States of \$123,735 09, liabilities \$5,248 75, and surplus \$118,486 34. There were six casualty insurance companies, of which two were New York companies, two organized in other states, and two were foreign companies, with aggregate assets amounting to \$3,110,737 11; liabilities, \$1,948,199 53, and a net surplus of \$1,162,537 58. The number of coöperative insurance companies transacting business in the state on the 1st day of January, 1882, was 115, having 325,524 certificates in force, of which 90,219 were written during the year 1881. Within the last-mentioned year 28,274 certificates terminated, and losses to the amount of \$4,742,090 were paid by this class of insurance organizations. During the year 1882 there was organized under the general insurance laws of the state one mutual fire insurance company, with a paid-up cash contribution of \$200,000, and one plate-glass insurance company, with a paid-up capital of \$100,000. Eight fire insurance companies, four organized in other states and four foreign companies, were during the year admitted to transact business in the state, with total assets amounting to \$3,220,464 36, and liabilities, including capital stock, amounting to \$1,554,788 42. Thirteen fire, two life, and two marine insurance companies, ceased to do business in this state during 1882.—The value of the property held by the various charitable institutions on the 30th of September, 1882, was \$41,103,809 54, of which \$33,501,605 36 was real estate, and \$7,602,304 18 personal property. The receipts of these institutions during the last fiscal year were \$10,186,810 91, derived from the following sources:

State of New York.....	\$719,302 40
Cities and counties.....	2,236,180 00
Paying inmates.....	871,017 13
Invested funds.....	897,074 90
Donations.....	1,283,876 59
Loans.....	855,943 00
Labor of inmates.....	63,747 05
All other sources.....	2,760,620 84

The expenditures during the same period were as follows:

State institutions.....	\$1,482,819 84
County and city institutions.....	2,340,806 55
Incorporated benevolent institutions.....	5,891,439 28

The number of state paupers in the various institutions Sept. 30, 1881, was.....	164
Committed during the year ending Sept. 30, 1882.....	1,892

Total.....	1,556
During the same period the number of deaths was.....	43
Discharged.....	1,850
	1,393

Under care Oct. 1, 1882.....	163
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Of the number reported as discharged, 778 were furnished transportation to their homes in other states and countries, or to their places of legal settlement.—The number of insane in the various institutions on the 30th of September, 1882, was 10,443, distributed as follows:

In state institutions.....	3,105
In county poor houses and asylums.....	1,995
In city almshouses and city asylums.....	4,739
In private asylums.....	503
In the asylum for insane convicts at Auburn.....	141

Total.....	10,483
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Of the insane in the state institutions, 2,022 were confined in the Willard and Binghamton asylums, they being entirely of the chronic class. The number of insane persons in the several institutions, as given above, is 384 in excess of that reported at the close of the previous year.—The earnings and expenditures of the state prisons during the year ending Sept. 30, 1882, were as follows:

AUBURN.	
Earnings.....	\$120,284 16
Expenses.....	122,926 48
Deficiency.....	\$2,692 27
CLINTON.	
Earnings.....	\$60,361 59
Expenses.....	99,606 47
Deficiency.....	\$39,244 88
SING SING.	
Earnings.....	\$241,821 98
Expenses.....	193,127 20
Surplus.....	\$48,194 78

The total earnings of the three prisons were \$6,257 58 in excess of their expenses. On the 30th of September the number of convicts confined in Sing Sing prison was 1,526, while Auburn contained 912, and Clinton 499. The asylum for insane convicts at Auburn contained 141 inmates.—The public-school statistics for the year ending Sept. 30, 1882, are as follows:

Total receipts, including balance on hand Oct. 1, 1881.....	\$12,543,446 34
Total expenditures.....	11,181,986 55
Amount paid for teachers' wages.....	7,956,383 96
Amount paid for school houses, repairs, furniture, &c.....	1,525,578 26
Estimated value of school houses and sites.....	80,383,641 00
Number of teachers employed for the legal term of school.....	20,869
Number of teachers employed during any portion of the year.....	31,252

Number of children attending public schools	1,041,089
Number of persons attending normal schools	6,156
Number of volumes in school district libraries	705,812
Number of persons in the state between the ages of 5 and 21 years	1,681,113

The number of children attending public schools during the last fiscal year was 19,807 in excess of the number reported the year previous.—The number of immigrants landed at Castle Garden during 1882 was about 460,000, being the largest number landed in any year since the creation of the commission in 1847. Of the appropriation of \$200,000, made by the legislature for the maintenance of the commission, \$47,569 46 had been expended at the close of the year in protecting the immigrants while landing, directing and forwarding those who had destinations fixed upon, assisting such as sought employment, and caring for the sick and helpless, and \$23,473 24 for special repairs to buildings. Under an act of congress, passed in August, the sum of fifty cents for each alien passenger intending to remain in this country was thereafter collected by the United States treasury department, and credited to the emigration commission. The sum collected for the first three full months after the law went into operation was \$8,000 less than the expenditure for that period.—The population of the principal places, by the census of 1880, was: New York city, 1,206,299; Brooklyn, 566,663; Buffalo, 155,134; Albany, 90,758; Rochester, 89,366; Troy, 56,747; Syracuse, 51,792; Utica, 33,914; Auburn, 21,924; Oswego, 21,116; Elmira, 20,541; Poughkeepsie, 20,207; Cohoes, 19,416; Yonkers, 18,892; Kingston, 18,344; Newburgh, 18,049; Binghamton, 17,317; Long Island City, 17,129; Schenectady, 13,655; Lockport, 13,522; New Brighton, 12,679; Rome, 12,194; Watertown, 10,697; Ogdensburg, 10,341; Amsterdam, 9,466; Jamestown, 9,357; Ithaca, 9,105; Port Jervis, 8,678; Hudson, 8,670. See map in supplement to volume XIII.

NIHILISM, a revolutionary movement in Russia, aiming at the destruction of the monarchy and of the Russian church, inspired by radical socialistic and free-thinking sentiments. The movement was provoked by the repressive measures of the emperor Nicholas, and nourished by the study of the forbidden books of German and other foreign rationalistic and materialistic authors. The spirit of rebellion against all manner of restrictions and authority first spread in the circles of the younger army officers, and was communicated by them to the pupils of the aristocratic young ladies' seminaries. An attempt was made to extend their rationalistic notions among the people, through Russian translations of the radical works from which the youthful revolutionists derived their inspiration. The incomplete reforms with which Alexander II. began his reign, instead of quieting the revolutionary movement, gave it a more decided character and a more definite shape, as a demand for more sweeping social and political changes than the mere introduction of con-

stitutional forms and safeguards. The sudden large extension of education effected by the removal in 1862 of the restriction limiting the number of students in each of the seven universities to 300, and throwing the high schools open to all classes, together with the abolition of Latin and Greek as obligatory studies, promoted the spread of revolutionary sentiments. The universities were the hotbeds of the new ideas. They were now visited by great numbers of students from the lower middle class of society. The number of matriculated students in the university of St. Petersburg immediately rose to 1,200, and in the Moscow university to 1,500. Young women also now entered the professional schools. Under the administration of Golovnin, who succeeded the illiberal Admiral Putiatin as minister of instruction, the study of the natural sciences was specially favored, and the discussion of politics in the students' debating clubs was permitted. Some disturbances in which students were implicated, and Karakozoff's attempted assassination of the czar, led to the resignation of the liberal minister in 1866, and the appointment in his place of Count Tolstoi, who put in practice a policy of restriction and surveillance so harsh that students began to feel that the liberty of their own class was peculiarly involved in the revolutionary movement. Persecuted by a galling system of incessant control and espionage; placed again under the command of curators, who were usually retired army officers, with free meetings and discussion forbidden, and all the old regulations and discipline restored and carried out with uncompromising rigor; liable also to arrest without a warrant, and to the severest punishments without trial, the students were goaded as if by intention into desperate plots and conspiracies. It appeared from the revelations made at the recent trials of Netchayeff and Solovieff, that the nihilistic party was three fourths composed of students and ex-students of the universities. From the beginning the Russian revolutionists have been exclusively young people. Among the host of nihilists who have been brought before the tribunals, it was rare to find one over 27 years old. There is, however, a large and influential class of believers in constitutional reform, who, without sharing in the excesses of the revolutionists, are equally dissatisfied with the present government, and regard with complacency their relentless course of terrorism. In Russia society is still in a very raw and primitive stage of development. There is nothing ancient. The patriarchal and spiritual authority of the czar, respected by the peasantry, is recognized by the student of history as a modern excrescence. The most venerable institution of the country is communism. The studious youth of Russia, suddenly initiated into the materialistic, atheistic, and socialistic speculations of the most radical schools of European thought, suddenly losing every sentiment of loyalty to the czar and reverence for the church, conceived a hatred for the

whole existing order of society, and a repugnance to every kind of traditional restraint. If all law and government were abolished, the natural desires and instincts of the human heart would lead, they reasoned, to healthier conditions of society. They adopted the programme of annihilation and anarchy, trusting the reconstruction of society entirely to the future, partly because they wished to dissociate their movement from the other revolutionary schemes of Europe. The term nihilism was first applied to the new tendency by the novelist Turgeneff when describing it in his novel "Fathers and Sons," and was afterward accepted as their party name by the nihilists. The most eloquent and effective expression of the nihilistic sentiments of rebellion against law, religion, and traditional morality is the novel "What to Do," by Tchernyshevski, for publishing which the author was condemned in 1864 to 16 years' penal servitude in Siberia. This work, printed in Berlin and Switzerland, and smuggled into Russia, became the gospel of Russian radicalism; the principles enunciated in it with great force spread like an infection among the youth of Russia; the very irregularities of the cynical men and emancipated women who figure in the story came into fashion, and were repeated in the lives of many of the young nihilists who have appeared before the tribunals. When the movement began to assume a definite form, it found an energetic leader and expositor in Michael Bakunin, after he had been expelled from the "Internationalist Society" and from the "League of Universal Peace" in 1868, and shut out from the workingmen's congress at the Hague in 1872, on account of the violent measures to which he endeavored to commit these organizations. The Slavic section, established by Bakunin in Zürich, detaching itself from the general European socialistic movement, gave the tone to the revolutionary party in Russia, which professed his extreme views, and aimed avowedly not only at the overthrow of the autocracy, but also at the abolition of property, of religion, and of the family. The conclave which under Bakunin now directed the propaganda in Russia took the name of the "International European Revolutionary Alliance," but its revolutionary designs were confined solely to Russia. From this time dates the development of the remarkable secret league in Russia which carried on the work of agitation, and soon also the work of deadly vengeance. The strength and terrible efficiency of this confederation is due, not to close organization and subordination to a directing chief, but to the devoted zeal of the members, and the unanimity in purposes and methods which has been developed by many years of secret revolutionary agitation. The nihilistic organization consists of a multiplicity of little knots of people, initiated by the numerous missionaries, who are usually young students or graduates from the universities or girls' seminaries. The revolutionary propaganda is all that passes from lip to lip.

The members are usually unacquainted with either the names or the persons of the leaders, or of any of the other members outside of their own little bands. The great object of the agitation is to disseminate the doctrines among the peasantry, an object in which the nihilists have hitherto failed almost utterly. Students are sent from the university to bear the rude labor of the field and the workbench; delicately reared young ladies are directed to enter the huts of peasants in the disguise of servant maids. They obey with zealous eagerness, and apply themselves to the task of converting the great peasant class, which embraces nearly the whole population of Russia.—At the time of the attempt of Karakozoff to assassinate the czar, April 16, 1866, the philosophical doctrines which gave birth to nihilism were rife in the country; but there was at that time no well defined political movement and no secret organization. But these developed rapidly under the policy which was then inaugurated by the government. The character of the reactionary measures that were carried out by Count Tolstoi as the head of the ministry of education is best attested by the letter which was sent to him by the central committee of the nihilists in 1879: "Your excellency has nothing to fear from us. We fully acknowledge the value of the services which you have rendered and still continue to render to our cause. We assure you that your safety will always be precious to us." Count Peter Shuvaloff, who was appointed chief of the "Third Section" or secret police, set his spies on the search for political reformers, who, whenever caught, were hurried off to Siberia without ceremony. A strong and determined revolutionary party sprang up. Secret organizations were formed in Moscow, St. Petersburg, and the other cities. The ablest and most decided of the radical reformers fled to England and Switzerland, and secret agents flooded Russia with revolutionary pamphlets and journals, printed in London and Geneva. This mode of propagandism had a precedent in the famous journal called *Kolokol* ("The Bell"), established by Hertzzen and published for many years by him in connection with Bakunin. The movement, which first took a political form under the provocation of the reactionary measures of the government, found its natural leader in Bakunin, whose doctrines were a systematic and positive development of the sentiment of revolt against all laws, rules, and customs, which forms the fabric of Tchernyshevski's novel, and of the humanitarian philosophy which is its groundwork. Bakunin declared war against the state, all existing social institutions, religion, and all preconceived rules of moral conduct. His notion was, that if all traditional regulations, sentiments, and beliefs could be entirely eradicated from the hearts and minds of men, if all children were given the same education and support, then all men might be allowed to follow each his own bent and inclinations and govern his own conduct; that

under such conditions crime and misery would in a great measure disappear, the inequalities of society would have no tendency to revive, the spirit of fraternity would spread and flourish, and happiness become a universal heritage. "Our first work," said Bakunin, "must be destruction and annihilation of everything as it now exists. You must accustom yourselves to destroy everything, the good with the bad; for if but an atom of this old world remains, the new will never be created."—In the course of the savage conflict between the Russian government and the nihilists, and after Bakunin had died (1876) and his anarchic theories had lost their influence, their programme narrowed down to a more definite and tangible purpose, and embraced only practical political aims—the overthrow of the czarism and the establishment of a constitutional government, under which socialistic institutions, which they believe to be peculiarly adapted to the genius of the Slavic race, shall be fostered and allowed freely to develop. The following manifesto, emanating from the executive committee of St. Petersburg, was published in one of the chief nihilistic organs, the *Narodnaya Volya*, issued at the Russian capital:

1. We hold the overthrow of the present government to be our first and foremost duty. By this revolution our nation shall attain—1, the faculty of an independent development of all its forces, according to its own will and customs; 2, the possibility of a further growth of the socialistic institutions forming a part of our national life, such as the *artel* (workmen associations), the *obshchchina* (land commune), &c.

2. We hold that the will of the people may be clearly expressed in a national assembly, elected by universal suffrage, which, though not by any means an ideal form of expression, is nevertheless the only one possible under the present circumstances.

3. It is, therefore, our intention to take the state power from the hands of the present government and confer it on a national assembly, which is to decide as to the future constitution of our country.

Therefore we demand—1, a regular representative assembly elected by universal suffrage; 2, full local self-government of all provinces, districts, and townships; 3, the village commune, an independent, economical, and administrative unity; 4, the land to be declared state property; 5, a system of measures aiming at the transmission of all factories and workshops to cooperative associations of working men; 6, full liberty of conscience, of speech, of the press, of associations and meetings; 7, universal suffrage, without limitation as to class or property; 8, abolition of the standing army and institution of a national militia.

In view of the above-stated principles our action comprehends—1. Propaganda and agitation. Our propaganda purposes to diffuse among all classes of our people the idea of a democratic political revolution as the only means for attaining a better social condition. 2. Destructive and terroristic action. Our terroristic action consists in the destruction of the most pernicious agents of the government, of spies, agents of the third section, &c. The purpose of these violent acts is to rob the government of the czar of its prestige in the eyes of the people, to show the latter the possibility of a struggle with the government, and to foment thus the revolutionary spirit in the ranks of the people. 3. Organization of secret societies. 4. Secret agencies in the ministries, in the army, in society, and so forth, have been instituted in all parts of the empire. New agencies are yet to be opened. 5. Organization and outbreak of the revolution. The people being oppressed and the government yet too strong, the party must take upon itself the initiative of the revolutionary outbreak. When and how can of course not be published.

—The terrorism systematically practised by the nihilists in deeds of bloody violence—which, whether instigated by the leaders or voluntarily perpetrated by isolated individuals and bands of conspirators, are avowed and approved as

acts of the party in its organs—has filled the authorities with consternation, but has not intimidated them into a course of compromise and concession. Neither has the terroristic policy of the revolutionists accomplished to any appreciable extent its main object, openly avowed in the programme given above, of weakening the faith of the peasant class in the sacredness and perpetuity of the autocracy. The pursuit of murder and arson as a method of political agitation stamps upon the movement the character of a hideous crime or of a contagious mania. But many of the acts of violence were intended as reprisals. Hunted by the police and subjected to cruel and fatal punishments, often executed in secret and without the forms of justice observed in civilized countries, the nihilistic party constituted itself into a sort of Vehm court, reviewing in its councils the cases of those who were accused of acts of arbitrary cruelty toward members of the party, and passing formal judgments, to be executed by some nihilist selected for the dread mission. The chosen agent seldom fails to carry out the sentence, or to attempt to do so, usually at the cost of his own life. Several, however, have escaped the performance of their murderous tasks by suicide. The acts of crime and violence supposed to have been committed by the nihilists began with the murder of Ivanoff, a member of the party, by Netchayeff, in 1873. The latter had arrived at St. Petersburg in 1869 with credentials from Bakunin, which gave him a leading position in the party. After the murder he fled to Zürich, and, being delivered up by the Swiss authorities, was tried and sentenced as a common murderer at Moscow. Netchayeff made a confession, in which he revealed the names of 183 persons as belonging to the nihilistic party; and they were all arrested on the same day, May 20, 1875, and brought to trial on the charge of seeking to propagate nihilism among the lower classes. These were all young people, many of them girls, out of the middle class of society, the children of Jewish and other tradespeople, of priests, and of minor officials. This monster trial was conducted on the jury system, and lasted eighteen months. The frank and at times impassioned avowals of nihilistic principles by many of the prisoners, notably of the student Myshkin, did almost as much to strengthen the cause of nihilism in Russia as the secret propaganda had done. Of the 183 accused, 99 were sentenced to penal servitude in Siberia and 36 to be subjected to police supervision for a number of years; the remainder were acquitted. This trial was concluded in December, 1877. On Feb. 5, 1878, the country was startled by an attempt to assassinate Gen. Treppoff, prefect of St. Petersburg, who was shot in the street, by order of the executive committee, to avenge the inhuman treatment of Bogoluboff, a nihilist convict. Vera Sassulitch, an ex-student of medicine, who had herself been subjected to a galling surveillance of the police on account

of her former acquaintance with Netchayeff, was readily induced to undertake the desperate deed. Trepoff was seriously, but not fatally, wounded. The jury acquitted Vera, although she had pleaded guilty. She was set at liberty, and escaped to Switzerland. Her example and the popular sympathy awakened at her trial seem to have brought political assassination into fashion. On the 16th of the following August Gen. Mezentzeff, director of the third section of the imperial chancellery (the bureau of the secret police service, and source of administrative incarcerations and banishments without trial for political offences), was shot in the streets of St. Petersburg by a young man who escaped. The same summer Baron Heyking, commandant of gendarmes at Kiev, was assassinated, and on Feb. 21, 1879, Prince Krapotkin, governor of Kharkov. On March 25 an attempt was made on Gen. Drenteln, Mezentzeff's successor. Other acts of vengeance committed by the nihilists were an attempt on the life of Kotliarevski, provincial procurator at Kiev; the attempted assassination of Tchertkoff and Hübinet, the two chiefs of the Kiev police administration; attacks upon Gorinovitch and Gosh-toff, and the murders of Nikonoff, Tavleyeff, Fizogonoff, Roitenstein, and others, suspected traitors in the party; and the repeated killing of gendarmes and police soldiers in resistance to arrest. In the summer of 1879 several hundred fires broke out in St. Petersburg, Orenburg, Kozlov, Irkutsk, Uralsk, and Kiev, the greater part of which were attributed to nihilists.—The attempts on the life of the emperor spurred the authorities to the most energetic endeavors to crush out the nihilistic party; yet the utmost vigilance of the police could not prevent the first attempt from being rapidly followed by three others, the last two of which only failed of their purpose by accidental failures in punctuality in the movements of the emperor. The first nihilistic attempt to assassinate the emperor Alexander was that of the schoolmaster Solovieff, with a pistol, in the garden of the summer palace, April 14, 1879. The perpetrator was immediately arrested, sentenced on the 7th, and hanged on the 9th of June. Military law was proclaimed in six provinces, and wholesale arrests and deportations to Siberia took place. Generals Gurko, Loris-Melikoff, and Todleben were made the supreme military governors in the governments of St. Petersburg, Kharkov, and Odessa, and the existing governors were given the same dictatorial powers in those of Moscow, Kiev, and Warsaw. During the years 1878 and 1879, 16 trials of nihilists took place in the regular courts, including the various monster trials; 20 prisoners were condemned to death, and about 400, including 50 women, were banished to Siberia. After the proclamation of martial law, the banishments to Siberia were numbered by thousands, and before that time unknown numbers had been despatched to the penal colonies. Half a dozen secret printing offices were bro-

ken up by the police, but only one of importance. On Dec. 21, 1879, a startling attempt to take the life of the emperor was made while he was journeying to Moscow by rail. A mine of dynamite was laid under the track near Moscow, and fired by means of an electric wire, destroying the baggage train, which was mistaken for the train bearing the emperor and his party, as the latter had been detained on the road and was later in arrival than the published time. A demand was made by the Russian authorities in February, 1880, for the extradition of a certain Hartmann, residing in Paris, as having been one of the principals in this crime. He was arrested, but was finally released and allowed to escape to England, the French government declaring that the proofs of his participation in the crime were insufficient to warrant extradition. Some time before this attempt an armed man had been caught who, in the guise of a messenger of the police and provided with a despatch from Gen. Gurko, had penetrated into the presence of the emperor. On Feb. 17, 1880, the fourth and most desperate attempt to murder the emperor took place. A mass of dynamite, estimated to have been 126 lbs., was exploded in the cellar of the winter palace, directly beneath the dining saloon, at the hour when the emperor was to have taken his dinner. The duchess of Edinburgh and the prince of Bulgaria were to dine with the emperor. Through some unforeseen delay they came behind the hour, and just as the party were about entering the dining room the explosion occurred, taking effect on the spot where the dining table stood; 10 men of the Finland guard were killed, and 43 wounded. The mine was fired by a battery from a neighboring house. A supreme commission of public safety was now created, of which Gen. Loris-Melikoff, the conqueror of Kars, an Armenian by birth, was given the appointment and full control. He was intrusted with almost absolute executive and discretionary powers, and was made answerable to the emperor alone. On March 3, 1880, the day following the anniversary of the emperor's accession, on which serious acts of destruction and violence had been threatened, Gen. Melikoff was shot at in front of his own door, by a young man of Jewish birth, who declared that the executive committee had determined upon the death of Melikoff and would accomplish their purpose.—After the death of Bakunin at Geneva in 1876, Dragomonoff, who resided in that city, was looked upon as the chief organizer of the movement. He was professor of philology in the university of Kiev until 1876, when, compelled to emigrate, he joined the staff of the *Obshtchina*, established by Bakunin as the organ of the party, starting also a sheet printed in the Little Russian dialect, and called the *Gromada*. Another leading spirit in the movement, also a collaborator on the *Obshtchina*, was Prince Krapotkin, brother of the murdered governor of Kharkov, who had distinguished himself as

a geologist in Russia and was first suspected of revolutionary propagandism in 1877, when he was thrown into prison in St. Petersburg, whence he escaped to Switzerland. A third conspicuous nihilist is Dmitri Klementz, suspected of having been, in the autumn of 1879 and up to the time of his arrest, one of the principal editors of the *Narodnaya Volya* ("Will of the People"), which is printed in St. Petersburg and is supposed to be the organ of the executive committee. The first number of this journal appeared in October, 1879. The leading organ of the nihilistic party previously was *Zemlia i Svoboda* ("Land and Liberty"), published also in St. Petersburg irregularly once or twice a month. See Schédo-Ferroti's *Le Nihilisme en Russie* (Berlin, 1867). The causes and sources of the disaffection and revolutionary tendencies are described in "Russia before and after the War," translated from the German (London, 1880).—See also "Underground Russia," translated from the German (London, 1882).

NORTH CAROLINA. The population of the state in 1880 was 1,399,750, of whom 687,908 were males, 711,842 females, 1,396,008 natives, 3,742 foreign, 867,242 whites, 531,277 colored, 1,230 Indians.—The chief agricultural productions were 44,668 bushels of buckwheat, 28,019,839 of corn, 3,838,068 of oats, 285,160 of rye, 3,397,393 of wheat, 93,711 tons of hay, 5,609,191 lbs. of rice, 389,598 bales of cotton, 26,986,213 lbs. of tobacco, 722,773 bushels of Irish and 4,576,148 of sweet potatoes; number of horses, 133,686; 81,871 mules and asses, 50,188 working oxen, 232,133 milch cows, 375,105 other cattle, 461,638 sheep, 1,453,541 swine; value of manufactures, \$20,095,037; gold mined, \$118,953; copper ingots, 1,640,000 lbs.; value of fishery products, \$845,695.—There were 6,161 public schools, including 2,146 for colored children; expended for school purposes, \$383,709; pupils enrolled, 256,422, of whom 95,160 were colored; average attendance, 164,570.—The act of March 4, 1879, "to compromise, commute, and settle the state debt," expired on Jan. 1, 1882. It provided for the redemption of the principal of the bonded debt therein recognized, as follows:

Bonds issued prior to May 20, 1861, 40 per cent., exclusive of \$100,000 of old bonds surrendered under a special act by the Albemarle and Chesapeake canal company.....	\$5,477,400 00
Bonds issued since the close of the war, by authority of acts passed before the war, and registered certificates of the board of education, 25 per cent.....	3,261,045 00
Bonds issued under the funding acts of March 10, 1866, and Aug. 20, 1868, 15 per cent.....	3,888,600 00
Total.....	\$12,627,045 00

Bonds have been redeemed as follows:

First class, as described above, 40 per cent....	\$4,244,500 00
Second class, at 25 per cent.....	2,164,045 00
Third class, at 15 per cent.....	2,412,200 00
Total.....	\$8,820,745 00

New 4 per cent. bonds have been issued as follows:

For bonds at 40 per cent.....	\$1,697,800 00
For bonds at 25 per cent.....	541,011 25
For bonds at 15 per cent.....	861,830 00
Total.....	\$2,600,641 25

In this amount are included certificates issued in exchange for fractional sums less than \$50, still outstanding, and receivable for new bonds, in amounts of \$50, \$100, \$500, and \$1,000. The old bonds yet outstanding and fundable under the act are:

Redeemable at 40 per cent.....	\$1,232,900 00
Redeemable at 25 per cent.....	1,097,000 00
Redeemable at 15 per cent.....	1,476,400 00
Total.....	\$3,806,300 00

Should the general assembly, at its session in 1883, extend the compromise act of March 4, 1879, the actual and prospective debt of the state will be:

Actual debt bearing 4 per cent. interest.....	\$2,600,641 25
Prospective debt bearing 4 per cent. interest..	988,870 00
Actual debt bearing 6 per cent. interest.....	1,720,000 00
Prospective debt bearing 6 per cent. interest (old bonds now being renewed).....	1,075,000 00
Total.....	\$6,384,511 25

The receipts of the "public fund," which is charged with all moneys derived from taxation and other ordinary sources of revenue, and credited with all disbursements of whatever character, not connected with the educational fund, for the year ending Sept. 30, 1882, amounted to \$755,881 44. After all deductions, the available revenue was \$624,921 44. The total disbursements for the fiscal year amount to \$629,112 37; but the expenses legitimately chargeable to the fiscal year amount to only \$527,057 37. The balance to the credit of the public fund at the close of the fiscal year was \$254,189 78, made up as follows:

Accumulated funds to pay interest on the 4 per cent. consolidated debt of the state.....	\$224,036 96
Amount received from receiver of North Carolina railroad.....	29,460 00
Amount applicable to general expenses.....	642 82
Total.....	\$254,189 78

This large balance to the credit of the interest fund is due to the fact that nearly \$1,000,000 of the new 4 per cent. bonds remain unissued because the redemption of the old bonds under the act of March 4, 1879, was discontinued on Jan. 1, 1882. The revenue act of the state authorizes a tax of 6 cents on the \$100 worth of property, for the general fund for the support of the state government; 11 cents for the support and completion of the asylums for the insane; 5 cents for the support of convicts and construction of the penitentiary, and 6 cents for payment of interest on the public debt, making a total tax of 28 cents per \$100 on the assessed value of property, the aggregate value of which, as shown by the report of the state auditor, published Nov. 30, 1882, amounts to \$167,738,639. As in many other southern states, the valuations of property for taxation in North Carolina are far below the cash value, and very

unequal in the various counties. The limit of taxation fixed by the constitution is $66\frac{2}{3}$ cents on the \$100 worth of property. Of this, 28 cents are required to pay the expenses of the government, and the remaining $38\frac{2}{3}$ are needed to pay the expenses of the counties. It is estimated that there are 490,000 educable children in the state, and the amount raised by state taxes for education has never exceeded \$500,000.—A satisfactory settlement of the question so long in dispute between the state and the bondholders of the North Carolina railroad is now (1883) being executed. The state is the owner of \$3,000,000 of stock in that road; private stockholders own \$1,000,000. To pay for this stock the state issued her bonds in 1853-'54-'55, to run for 30 years, at 6 per cent., and to secure their payment pledged the dividends accruing on her stock for the payment of the interest, and the stock itself for the payment of the principal. In 1866 \$205,000 of these bonds were taken up, leaving outstanding \$2,795,000. The road was leased to the Richmond and Danville railroad in 1871, for $6\frac{1}{2}$ per cent. on the capital stock; and soon after a suit, known as the Swasey suit, was begun in the federal court to subject the rental arising from the lease to the payment of the interest on the bonds. A receiver was appointed, who has found the dividends to be sufficient to pay the interest. Under an act of the legislature of 1879, providing for the adjustment of that part of the state debt incurred in aid of the North Carolina railroad, a plan of adjustment was agreed on, by which the old bonds are to be exchanged for new bonds of equal amount, with interest payable semi-annually at 6 per cent. per annum, the surplus of the dividends on the stock owned by the state, after paying the interest on the new bonds, to be used as a sinking fund for the payment of interest on such of the old bonds as have not been presented and proved in the federal court, and then for the payment of the interest and principal of the new bonds. Up to Dec. 31, 1882, the treasurer had issued, under this agreement, \$1,720,000 new bonds. There are \$22,000,000 "special tax" bonds, fraudulently issued (as is alleged) by the "carpet-bag" government in 1868 and 1869, and since repudiated by the laws and constitution of the state.—The university of North Carolina, at Chapel Hill, had 199 students in attendance during the collegiate year 1881-'2. The institution received during the year \$12,000 from the state. Davidson college, under Presbyterian, and Trinity college, under Methodist, control, are well attended. There are 817 churches in the state, of the estimated aggregate value of \$789,025. During 1882 \$84,402 were expended for building and repairing churches. The school law, passed at the session of the general assembly in 1881, has been found to work admirably, though the means to carry it out fully can not be supplied under the existing constitution, which limits the authority of the legislature to

levy taxes to \$2 on the poll and $66\frac{2}{3}$ cents on the \$100 worth of property. The state board of education made arrangements early in 1882 for opening 5 normal schools for whites, and later for an equal number for colored pupils. These schools have been well attended.—The institution for the deaf, dumb, and blind, in the two years ending Dec. 31, 1882, provided for 105 deaf and dumb and 91 blind inmates, who were instructed in several useful handicrafts. There is a separate department for colored people where, during the two years, 38 deaf and dumb and 22 blind pupils were taught.—On Nov. 1, 1882, there were 996 convicts in the state, of whom 137 were white, and 859 colored. Besides the large insane asylum near Raleigh, containing on Nov. 1, 1882, 265 patients—140 males and 125 females—the western asylum at Morganton will be ready to receive patients in 1883, and the asylum for insane colored people, at Goldsboro, now contains over 100 patients. So much has insanity increased within the past quarter of a century, that it is doubtful whether even these three institutions will be adequate. Over 1,000 lunatics on Nov. 1, 1882, were cared for in the various counties. During the year the state expended \$158,000 on these asylums. The Oxford orphan asylum sheltered during the year 145 orphan children, at a cost of \$14,032 66, to which the state contributed \$5,000. The institution is under the auspices of the masonic fraternity.—The completion in May, 1882, of the railroad from Wolf creek to Paint Rock, makes the connection continuous between the North Carolina system of railroads and the East Tennessee, Virginia, and Georgia trunk line. The road from Asheville to Pigeon river is completed. The Raleigh and Seaboard was completed in 1882 from Williamston to Tarboro, and the work between the latter point and Raleigh is in progress. The railroad from Halifax to Scotland Neck, 20 m., was finished in April, 1882, opening a fine section of the state.—Upward of 5,000 persons, 100 vessels, and 3,000 boats are employed in the fisheries. The average annual product is upward of 30,000,000 lbs. of fish, worth between \$800,000 and \$900,000. The catch of the alewife is larger in the waters of North Carolina than in those of any other state, being a little under 16,000,000 lbs. annually. The shad fisheries yield about 4,000,000 lbs., and, being marketed earlier, are worth more than those caught elsewhere. The mullet fisheries are second only to those of the Florida coast. Of terrapins upward of 40,000 are caught annually, of the estimated value of \$11,000.—There are 15 national banks in the state, with a present capital of \$2,501,000, and a surplus fund of \$474,956. The individual deposits at the last statement amounted to \$2,889,789, and other deposits to \$190,840; the loans and discounts to \$4,738,012.—The area planted in cotton is becoming greater every year, and the improved culture is annually increasing the yield per

acre.—The manufacturing enterprises, the number of which is increasing largely from year to year, are prosperous and remunerative. North Carolina used to be called "the turpentine state," and later "the peanut state." Now she is known for her cotton, rice, grain, woods, minerals, tobacco, and manufactured goods. There are 3,802 factories in the state, worth \$13,045,639, employing 18,109 hands, who are paid \$2,740,758 in wages, and who work up materials worth \$13,090,937, and produce goods worth \$20,095,037. The manufacture of pine-wood oil (an industry confined exclusively to Wilmington) has grown largely. The oil is distilled from "fat pine" or "lightwood" at the rate of 80 gallons of oil to 1 cord of the wood. Its chief use is for the preservation of wood.—The population of the principal places, by the census of 1880, was: Wilmington, 17,350; Raleigh, 9,265; Charlotte, 7,094; New Berne, 6,443. See map in supplement to volume VII.

OAKES, John Wright, an English landscape painter, born in Cheshire in 1822. His pictures include "An Old Sand Pit," "Water Meadows, Sandwich," "The River in Flood," "Source of the Thames," "Repairing the Old Boat," "A Mountain Stream, Aberdeenshire," "A Sandy Bit of the Road," "Fording a Tidal Creek," "Dirty Weather on the East Coast," "A Mountain Valley," "A Solitary Pool," "Aberfraw Bay," "Glen Derry," and "The Dee Sands."

OBELISK (Gr. *ὀβελίσκος*, diminutive of *ὀβελός*, a sharpened thing, a skewer or spit), a lofty monolithic, quadrangular shaft, tapering gradually from the base to the summit, which terminates in a pointed, four-sided pyramid. The obelisks are among the most simple and striking of the architectural monuments of Egypt, to which country they are peculiar, and are connected by tradition with its earliest public works. The oldest of which we have any knowledge is that now standing at Heliopolis, inscribed with the name of Osortasen I., of the 12th dynasty, who flourished about 2000 B. C.; and between that era and the Persian conquest, 525 B. C., all those of Egyptian origin known to be in existence were erected. None occur of later date than the latter event. Many fanciful and ingenious theories have been advanced to explain their purpose and origin, but without clearing the mystery attaching to the subject. They were long regarded as connected with the worship of the sun, and some have attempted to prove that they were employed as sun dials, or as monumental columns in honor of the great luminary. In the opinion of recent Egyptologists the obelisks were monumental structures, partly religious, partly historical in character, and to some extent ornamental, placed at the entrances of palaces and temples

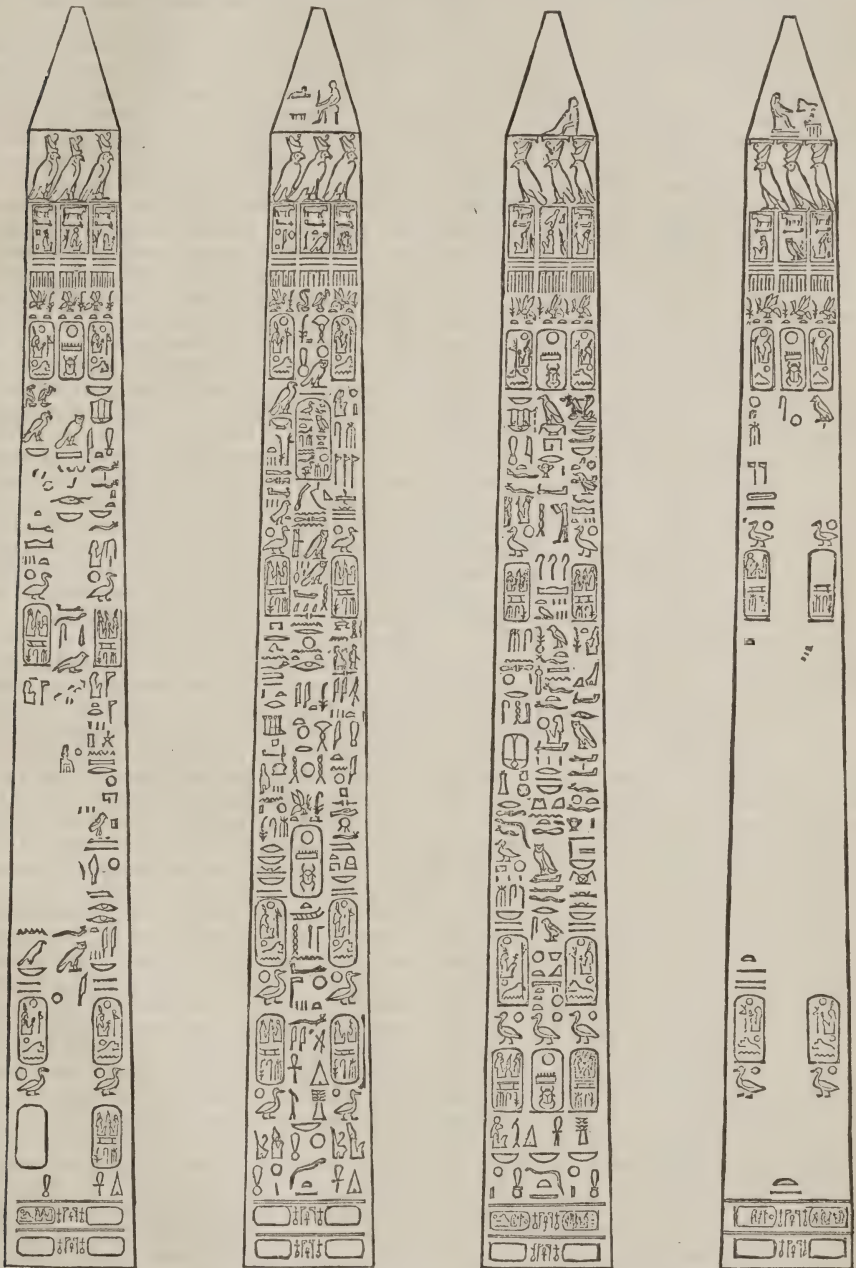
to indicate by the inscriptions carved upon them the purposes to which such edifices were to be applied, the divinity to which they were dedicated, the name and regnal year of the king who erected them, and other facts of sufficient public importance to be thus recorded. As architectural accessories they relieved the monotony of the numerous horizontal lines occurring in buildings constructed by the Egyptians. They generally stood in pairs, the smaller ones being either of sandstone or granite, while the larger were almost invariably of the rose-colored granite of Syene in southern Egypt, which is susceptible of a fine polish. The shaft was usually from eight to ten times higher than the width of its base, and one fourth narrower at the top than at the base, which rested on a quadrangular pedestal several feet broader than the obelisk. The base was seldom perfectly square, two of the sides being somewhat broader than the other two; and for the purpose of obviating the concave appearance which, under certain conditions of sunlight, a plane surface would present, the faces of obelisks, particularly of those which are opposite to each other, exhibit a slight convexity about their centres—"one of the many proofs," says Sir Gardner Wilkinson, "of their [the Egyptians'] attentive observation of the phenomena of nature." The apex or pyramidion was also more pointed in some obelisks than in others, and appears occasionally to have been sheathed with metal. Wilkinson mentions one near Biggig which has a rounded apex. They varied in height from 20 to somewhat over 100 ft., and the largest weighed from 400 to 500 tons. The process of hewing these colossal blocks from the quarries and transporting them, in some instances 800 m., to the places where they were to be erected, must be reckoned among the most wonderful achievements of the ancient Egyptians. The obelisk appears to have been rough hewn on three of its sides while adhering by the fourth to the quarry, from which it was finally separated by a number of metal wedges struck at the same instant along its whole length. Sometimes the wedges were of wood, which, being driven into holes previously cut for them and then saturated with water, split the stone by their expansion; although, according to Wilkinson, "such a method could only be adopted when the wedges were in a horizontal position, upon the upper surface of the stone; but those put into the sides were impelled by the hammer only." Some doubt has been thrown upon this theory of the method of excavation from the fact that the granite of Syene at the present day appears of too hard a texture to admit of being thus quarried. From an inspection of some of these quarries it would seem that the block, when separated from the rock, was lifted directly from the hollow in which it had been cut, although, according to Pliny, it was sometimes lowered down an inclined plane or platform to a raft, formed by lashing two flat-

bottomed boats together, and which had been brought up to the very edge of the quarry either at the time of inundation or by means of a canal dug from the Nile. This may have been the case with small obelisks, but the large ones were transported altogether by land on sledges and rollers, according to the method represented in the ancient picture which forms the frontispiece to the second volume of Sir Gardner Wilkinson's "Ancient Egyptians." Evidently the transportation of an obelisk from Syene to Heliopolis in Lower Egypt must have occupied several years. The erection of the obelisk when arrived at its destination was accomplished, according to Diodorus, by means of mounds or inclined planes of earth. Previous to this it was carefully polished, and the necessary figures and hieroglyphics were inscribed by the sculptor. Some, however, are without inscriptions of any kind.—The number of monuments of this species, probably at one time considerable in Egypt, has been greatly diminished by the violence of wars, neglect, and various physical causes. Many of them are no longer standing, but lie upon the adjoining ground, in some instances broken and mutilated. Under the Ptolemies many obelisks were removed to Alexandria; and the Romans, upon becoming masters of Egypt, conveyed several of great size by sea to Rome as memorials of their triumphs. Eleven of these are still standing there, although not in the positions where they were originally placed, the greater part having been overturned and in some instances broken during the decline of the empire and the successive plunderings of the city by barbarian hordes. Sixtus V. first conceived the idea of reërecting or restoring these ancient monuments of art, and in 1586 the obelisk of the Vatican was placed on its present pedestal by the architect Domenico Fontana, whose plan had been selected out of 500 offered to the pope. This obelisk, which, exclusive of its base and the ornaments on the apex, has a height of 82 ft. 2 in., was brought from Heliopolis by the emperor Caligula, in a ship described by Pliny as the largest which had ever navigated the sea. The same pope, with the assistance of Fontana, subsequently erected the obelisks of Santa Maria Maggiore, the Lateran, and the Piazza del Popolo, each of which was found lying on the ground, broken into several pieces, and encumbered with rubbish. That of the Lateran, the largest now known, was brought from Heliopolis to Alexandria by Constantine the Great, and was removed to Rome by his son Constantius, who placed it on the spina of the Circus Maximus. Notwithstanding a portion of the lower part was cut off by Fontana, in order to adapt the fragments, it measures 105 ft. 7 in. without the ornaments and pedestal, and is estimated to weigh 450 tons. That in the Piazza del Popolo, measuring 78 ft., was brought from Heliopolis by Augustus and placed in the Circus Maximus. This and that of the Lateran are covered with

hieroglyphics, but the obelisk of Santa Maria Maggiore, the smallest of the three, is destitute of them. The other obelisks in Rome are: that of the Piazza Pavona, 51 ft. high, found in the circus of Romulus, and erected by Bernini in its present position in 1651, during the pontificate of Innocent X.; that of Santa Maria sopra Minerva, 39 ft., erected in 1667 by Bernini, in the pontificate of Alexander VII.; that of the Pantheon, 17 ft., erected in 1711 by Clement XI.; those of Monte Cavallo, 45 ft., Trinità de' Monti, 44 ft., and Monte Citorio, 71 ft. 6 in., erected in 1786–'92, under Pius VI.; and that of Monte Pincio, 30 ft., erected in 1822, under Pius VII. In all cases the dimensions of these are given without the bases or the tasteless additions in the shape of globes, stars, or rays, which the Romans placed on the apices under the impression that they were originally intended for sun dials. Several of those in modern Rome terminate in crosses. Obelisks were also transported to Constantinople before the severance of the empire, and others are to be found in Velletri, Benevento, Florence, Catania, and Arles, although not all of these are of Egyptian origin. That in the last named place, which was discovered in 1389 buried in the mud of the Rhône, and erected in its present position in 1675, is nearly 54 ft. in height.—The obelisks remaining on their ancient sites are comparatively few. Among the most famous are: that at Heliopolis, already mentioned, 68 ft. 2 in. high above the base, and which formerly, according to tradition, had a companion one; a very fine one at Luxor, 70 ft. 2 in. high, erected by Rameses II.; and four at Karnak, the two largest, of which one is fallen, measuring 92 ft. in height by 8 at the base. A companion obelisk to the one in Luxor was in 1833 transported to Paris, and in 1836 erected in the Place de la Concorde, where it now stands. The so-called Cleopatra's needles, which are about 70 ft. in height, with a diameter at the base of 7 ft. 7 in., stood originally at Heliopolis in front of the great temple of the sun. After remaining 1,600 years in this position, they were removed from their pedestals by the Romans, floated down the Nile to Alexandria, and re-erected there in 23 B. C. As Cleopatra had then been dead seven years, it is difficult to tell why they received her name. One of the two was presented by Mehemet Ali to the British government, but as it was considerably mutilated it was for a long time considered unworthy the expense of removal. Therefore it remained buried in the sand at Alexandria until 1877, when Dr. Erasmus Wilson offered to transport it to London at his own expense. Under the superintendence of an English engineer, Mr. Dixon, the obelisk was fastened by cross divisions of wood in a cylindrical vessel of wrought-iron plates, about 95 ft. long and 15 ft. in diameter, which was built around it. After being rolled into the sea, it was ballasted and provided with a keel, deck, sail, and rud-

der, and a small cabin on deck for two or three sailors. The cylinder was towed by a steamer, the sail being used only to steady it. It was taken safely through the Mediterranean, but

was abandoned during a storm in the bay of Biscay, it was supposed, in a sinking state. It was recovered, however, by another steamer, and taken into Vigo, Spain, whence, in Janu-



The Hieroglyphs on the Four Sides of the New York Obelisk (from Champollion).

ary, 1878, it was safely towed to London. The raising of this obelisk upon the Thames embankment was a novel feat of engineering. It was hauled upon a timber cradle and lifted

with hydraulic jacks till its centre rested on the centre of the pedestal. The iron cylinder was then taken off, and replaced by an iron jacket, provided with arms or trunnions like

those of a cannon, which surrounded the central part of the column for a distance of 20 ft. The trunnions rested upon iron girders, which, by means of timber scaffolding and hydraulic jacks, were lifted to a height a little more than half the length of the obelisk, when of course it hung perpendicularly, like a pendulum at rest, over its pedestal, and was easily lowered to its seat. The second Cleopatra's needle was presented by the khedive to the city of New York; and in 1880 it was brought thither at private expense, and erected in the Central park, on a knoll near the metropolitan museum of art.—Monuments of the obelisk form, not in all cases monolithic, have not been uncommon in modern times, that erected on Bunker hill being a well known example. Monolithic monuments nearly resembling Egyptian obelisks have been excavated among the Assyrian ruins of Nimrud. The British museum contains an interesting specimen, 6 ft. 6 in. high, 2 ft. wide at the bottom, and 1 ft. 6 in. at the top, which, instead of terminating in a pyramid, diminishes by three steps, the summit presenting a perfectly flat surface. It is profusely adorned with bass-reliefs and inscriptions, but is far inferior in design and execution to the Egyptian monoliths. The obelisk in Axum, Abyssinia, the survivor of 55 monuments of this kind once standing there, terminates in a rounded patera, and has been supposed to be of a date later by many centuries than the most recent Egyptian obelisks.

OBSERVATORY. The following is a brief account of the most important observatories of the world (1880), with notes as to the work to which they are specially devoted. The United States naval observatory, Washington (Rear Admiral John Rodgers, superintendent), is fully equipped, and has since its foundation in 1845 prosecuted regular observations. Since 1861 it has published an annual volume. The large transit circle makes regular observations of the sun, moon, major and minor planets, and stars. The mural and transit instruments are now out of use, but a catalogue of over 10,000 stars has been published, which depends on observations with them. The 26-inch equatorial has been used in observations of double stars, nebulae, and the satellites of Mars, Saturn, Uranus, and Neptune. The satellites of Mars were discovered by Prof. Hall in 1877 with this instrument, and the masses of Neptune and Uranus depend on observations made with it. The Allegheny observatory, near Pittsburgh (Prof. S. P. Langley, director), is particularly equipped for researches in solar physics, by spectroscopy, photographs, &c. The observatory of Harvard college, Cambridge, Mass. (director, Prof. E. C. Pickering), is fully equipped as a first-class observatory. The new meridian circle is engaged in observing a zone of stars ($+50^{\circ}$ to $+55^{\circ}$) for the German astronomical society, and the 15-inch equatorial is chiefly employed in spectroscopic and photometric researches. In the latter field especially much important work has

been done. Its volumes (11 in all) are published at irregular intervals. The Dearborn observatory at Chicago possesses an 18 $\frac{1}{2}$ -inch refractor, which is used by Mr. Burnham, an amateur, in his extensive double-star observations. The Litchfield observatory of Hamilton college, at Clinton, N. Y., is under the charge of Dr. C. H. F. Peters, whose work is mainly directed to the discovery of asteroids and the computation of their orbits, and to the making of elaborate ecliptic charts. The same work has been until 1879 carried on by Prof. Watson at the observatory of Ann Arbor, Mich. A new observatory was founded about 1878 at Glasgow, Mo. (Mr. H. S. Pritchett, director), which has been active in observations of double stars, the satellites of Mars and Saturn, &c. It is completely equipped. The Cincinnati observatory (Prof. O. Stone, director) is mainly devoted to the observation and discovery of double stars, in which field a remarkable amount of work has been done. Argelander and Schönfeld's *Durchmusterung* is now being extended from -23° to -31° declination. It has published six volumes at irregular intervals. A new observatory with a 16-inch refractor has been founded at Madison, Wis., and is now under the charge of Prof. E. S. Holden. The Dudley observatory at Albany has been reorganized, with Prof. L. Boss as director; it is now observing a zone of stars for the German astronomical society, and is active in many ways. Mount Hamilton, 14 m. E. by S. from San José, Cal., has been decided on as the best site astronomically for the proposed Lick observatory. A space of 1,535 acres on the summit of the mountain has been set apart for the observatory. The exact size of the telescope to be used has not yet been determined, and will depend to some extent upon the success of the glass now being made for Dr. Otto Struve of Russia. In order to observe the transit of Venus in 1882, the trustees propose to secure at once a 12-inch refractor. A full equipment of instruments from the best makers will be soon ordered.—The following are the principal observatories of Great Britain and its colonies which are in active work in 1880. The royal observatory at Greenwich (Sir G. B. Airy, astronomer royal) continues the regular observations of the sun, moon, major and minor planets, and fixed stars, which have gone on with unflinching regularity for years, together with magnetic and meteorological observations. An annual volume of "Observations" is published, and the "Results" in astronomy and meteorology are extracted from this volume and separately published. Besides this, star catalogues and other works are separately published from time to time. A chief feature of Sir George Airy's superintendence has been the uniformity, regularity, and promptness with which the current observations are reduced and published, and also the computation and publication of the invaluable observations of the moon and planets made since 1750. In the

last few years the observatory has added to its work the photographing of the sun daily, and spectroscopic observations of all kinds—notably of the motions of stars in the line of sight; 63 stars have had their motions investigated in this way up to 1880. The Radcliffe observatory at Oxford (director, E. J. Stone) follows in general the Greenwich programme of meridian observations of the sun, moon, planets, and stars. It possesses a fine heliometer, lately used but little. It publishes an annual volume. The Savilian observatory of Oxford university (director, Prof. C. Pritchard) is principally devoted to extra-meridian work. Its work since its organization in 1876 has chiefly been in the direction of observations of comets, double stars and clusters, Saturn's satellites, &c., and in the taking of lunar photographs which are to be measured to determine the librations, &c. It has published one volume. The observatory of the university of Cambridge (Prof. J. C. Adams, director) is observing a zone of stars for the German astronomical society. Volumes are published at irregular intervals. At the Dunsink observatory, Dublin (Dr. Ball, director), the meridian circle is engaged on a catalogue of red stars. The equatorial has been and is employed in observing stellar parallaxes. Its publications are at irregular intervals. At the royal observatory, Edinburgh (Prof. C. P. Smyth, director), few astronomical observations have been made since the death of Prof. Henderson. A large star catalogue has been partly printed and issued by Prof. Smyth, whose work on the pyramids of Egypt and spectroscopy is also well known. The Glasgow observatory does but little observation at present. Its director, Prof. R. Grant, is reducing the work of previous years for publication. The Kew observatory (Mr. G. M. Whipple, director) is engaged in magnetic and meteorological work, in eye observations of sun spots, and in reduction of De la Rue's solar photographs of 1862-'71. The Liverpool observatory (Mr. John Hartnup, director) continues its transmission of time to the shipping and its tests of chronometers. It makes no regular publications except annual reports to the Mersey board of docks, &c. The Temple observatory, Rugby (Messrs. Wilson and Seabroke, observers), has been rebuilt, and will as heretofore be devoted to double-star observations and spectroscopy. The Stonyhurst observatory (Rev. S. J. Perry, director) keeps up a continuous record of magnetism and meteorology by photographic registration, and is about to engage in spectroscopy. Mr. Barclay's private observatory at Leyton (Mr. Talmage, observer) continues its double-star observations, &c. It has already published four volumes. Col. Cooper's private observatory at Markree, Ireland, continues its observations of binary stars and of meteorology. Dr. W. Doberck, the director, has published many investigations of the orbits of binary stars. Mr. Edward Crossley's pri-

ate observatory, Halifax (Mr. J. Gledhill, observer), makes regular observations of double stars, and observes the satellites of Jupiter and Saturn. Dr. William Huggins's private observatory has been devoted to the photography of stellar spectra, in which Dr. Huggins has made great advances. Up to 1880, 13 stars have been successfully observed, and the spectra of planets and the moon investigated. Lord Lindsay's private observatory near Aberdeen (Dun Echt) is thoroughly equipped and very active. The equatorials are devoted to spectroscopic observations of comets and double stars. This observatory has published two volumes, of which vol. i. is a résumé of Struve's double-star work, and vol. ii. is a deduction of the solar parallax from observations by Mr. Gill at Mauritius in 1874. A special expedition was sent by Lord Lindsay to observe the transit of Venus in 1874. Lord Rosse's private observatory at Parsonstown, Ireland, was until 1879 under the charge of Dr. J. L. E. Dreyer, who with others has prepared for the press the unpublished observations (since 1848) of nebulae. The royal observatory, Cape of Good Hope, now under charge of Mr. David Gill, royal astronomer, was until 1879 directed by Mr. E. J. Stone. Under his charge it became a miniature Greenwich, issuing its annual volume regularly, and publishing rapidly the observations made in former years. An important star catalogue has been printed. Mr. Gill proposes to make a catalogue of fundamental stars, and to determine (with a heliometer) the parallax of various southern stars, notably ζ Indi. The Melbourne observatory (Mr. R. J. L. Ellery, director) is observing the stars of the B. A. C. between 120° and 140° N. P. D., and others. The great 4-foot reflector is employed on a series of nebula observations. An 8-inch refractor is used for double-star observations. The sun is regularly photographed. The zone observations between 150° and 160° N. P. D. are completed and ready for publication. They comprise 48,000 stars down to 10th magnitude. A general catalogue of 1,227 stars has already been published. Magnetic and meteorological observations are regularly made and published.—Of the principal observatories of Germany, that of the academy of sciences, Berlin (Dr. W. Förster, director), is observing fundamental stars for the German astronomical society, and under its director the Berlin *Astronomisches Jahrbuch*, or "Nautical Almanac," is published. At the university observatory of Bonn the zone $+40^\circ$ to $+50^\circ$ is being observed, and Dr. Schönfeld, the director, is continuing Argelander's *Durchmusterung* from -2° to -23° . Variable stars and nebulae are also observed. Its volumes are published at irregular intervals. The Gotha observatory, under Dr. Krüger, is observing the zone $+55^\circ$ to $+65^\circ$. The Hamburg observatory (Dr. G. Rümker, director), besides caring for the chronometers of the port, is engaged in observing a zone of stars. The university observatory at Leipsic (Dr. C.

Bruhns, director) is observing a zone of stars for the astronomical society, and is very active in observations of asteroids, and in the geodesy and meteorology of Saxony. The Mannheim observatory, now removed to Carlsruhe, under Dr. W. Valentiner, is chiefly engaged in measures of clusters of stars. The new physical observatory (*Astrophysikalisches Institut*) at Potsdam, under Drs. Spörer and Vogel, is engaged in spectroscopic and other observations of the sun, planets, stars, and nebulae. Sun spots are regularly observed. The new university observatory at Strasburg (Dr. A. Winnecke, director) is actively engaged in heliometer observations of the sun, planets, and groups of stars in variable-star observations, in measures of nebulae, &c. The imperial observatory at Vienna has completed its new building, but is waiting for its 27-inch refractor, which is not yet made. The observatory at Pola, Austria (Dr. Palisa, director), is noted for its star maps (not published) and its discoveries of asteroids. The private observatory of M. de Konkoly, at O Gyala, Hungary, is observing the spectra of stars and carrying on a series of sun-spot observations. The observatory of Leyden (Dr. van der Sande Bakhuysen) is fully equipped, and has completed the observation of a zone of stars for the German astronomical society. It has published four volumes. The observatory of Brussels, under Dr. Houzeau, has been reorganized. Its late valuable contributions have been in the fields of astronomical bibliography and in ufanometry. The observatory of Pulkova is directed by Dr. Otto Struve; it has a full corps of observers and computers, and is fully equipped with the best instruments. The 15-inch refractor has long been well known for its work on double stars, satellites, and nebulae. It is to be supplemented with a 30-inch refractor from Alvan Clark and sons of Boston, ordered in 1879. The meridian instruments are engaged on fundamental stars and on a catalogue of naked-eye stars. Photometry, photography, and spectroscopy are also attended to. The observatory is the headquarters of the geodetic observations of the whole empire. The volumes are published at irregular intervals. The Moscow observatory, under Dr. T. Bredichin, is actively engaged in meridian observations of stars, in solar observations, and in photometry, and has made a specialty of observations of Jupiter and of the spectroscopy of nebulae and comets. The observatories of Stockholm (Dr. Hugo Gylden, director) and of Upsal (Dr. Hermann Schultz) are engaged in special researches. The former has principally published works on standard stars, the latter on double stars and nebulae. The observatory of Copenhagen (Dr. Thiele) is principally devoted to stellar observations. The observatory of Paris, long directed by Le Verrier, is now under the charge of Admiral Monchez. It is completely equipped, and, besides regular meridian observations of the sun and major and minor planets, regular observa-

tions of double stars, &c., are made. Several asteroids have been discovered here by the brothers Henry, who are engaged in continuing the ecliptic charts of Chacornac. Two series of volumes are published—one theoretical, and one of observations—at irregular intervals. The Marseilles observatory (director, M. Stephan) is active in the discovery of nebulae, asteroids, &c., and has engaged in geodetic observations. At Lyons, Toulouse, and in Algiers, new observatories have been founded; and a new observatory is to be established at Nice. The solar observatory of Meudon (M. Janssen, director) is engaged in photographic and spectroscopic observations of the sun. (See SUN.) The observatory of Palermo (M. Casciatare, director) is mainly devoted to the spectroscopy of the sun. Prof. Tacchini proposes to establish a new physical observatory on Mount Etna, at a height of 9,600 ft. above the sea. It will have an equatorial of 14 inches aperture. The observatory of Naples (M. de Gasparis, director) is the largest in Italy. Its meridian circle is engaged on a zone of stars for the German astronomical society. The observations with the equatorials are mostly of asteroids and double stars. The observatory of the Roman college, long under the direction of Secchi, is now in charge of P. Tacchini. Its chief activity is in solar spectroscopy. The observatory of Milan, under charge of M. Schiaparelli, is mainly devoted to double-star observations. A well equipped observatory is situated at Lisbon, under the direction of Capt. Oom. Its activity has up to this time been chiefly in the direction of geodesy. The observatory of Madrid, directed by Señor Arcimis, is principally known by its observations of sun spots. The observatory of the Argentine Republic at Cordoba (Dr. B. A. Gould, director) was founded in 1870, and has published a complete ufanometry of the southern sky, has finished a catalogue of 12,000 southern stars, and observed a series of zones from the south pole to -23° declination.

OHIO. The population of the state in 1880 was 3,190,062, of whom 1,613,936 were males, 1,584,126 females, 2,803,119 natives, 394,943 foreign, 3,117,920 whites, 79,900 colored.—The chief agricultural productions were 1,707,129 bushels of barley, 280,229 of buckwheat, 111,877,124 of corn, 28,664,515 of oats, 389,221 of rye, 46,014,869 of wheat, 2,210,923 tons of hay, 34,735,935 lbs. of tobacco, 12,719,215 bushels of Irish and 239,578 of sweet potatoes; number of horses, 736,478; 19,481 mules and asses, 8,226 working oxen, 767,043 milch cows, 1,084,917 other cattle, 4,902,486 sheep, 3,141,333 swine; value of manufactures, \$348,298,390; tons of coal mined, 5,932,853; iron ore, 198,835.—On the 15th of November, 1881, the public funded debt of the state was \$5,201,665. During the year there was paid the loan payable July 1, 1882, bearing 4 per cent. interest, \$300,000. On the 15th of November, 1882, the public funded debt of the state was \$4,-

901,665. This sum consists of the following loans:

Loan payable after Dec. 31, 1886, bearing 6 per cent. interest	\$2,400,000 00
Loan payable July 1, 1883, bearing 4 per cent. interest	825,000 00
Loan payable July 1, 1884, bearing 4 per cent. interest	350,000 00
Loan payable July 1, 1885, bearing 4 per cent. interest	350,000 00
Loan payable July 1, 1886, bearing 4 per cent. interest	375,000 00
Loan payable July 1, 1887, bearing 4 per cent. interest	500,000 00
Loan payable July 1, 1888, bearing 4 per cent. interest	600,000 00
Canal loan, not bearing interest	1,665 00
Total funded debt	\$4,901,665 00

The local debts at the same time were as follows:

Debts of counties	\$3,660,297 64
Debts of cities, first and second class	38,849,593 43
Debts of incorporated villages	1,311,330 33
Debts of townships	605,715 24
Debts of separate (special) school districts	1,339,414 53

Total local debts \$45,766,351 22

Net increase in above local debts from last year, \$1,652,250 47. This increase is as follows:

Increase in counties	\$437,613 36
Increase in cities	940,244 63
Increase in villages	255,512 37
Increase in townships	143,807 64

Total	\$1,781,678 50
Deduct decrease in school districts	129,428 03

Leaving net increase as above \$1,652,250 47

The balances in the treasury to the credit of the several funds at the close of the fiscal year 1881 were as follows:

General revenue fund	\$254,513 33
Sinking fund	208,265 59
State common-school fund	38,642 19

Total	\$501,421 11
The receipts into the treasury during the year from all sources amounted to	\$5,763,975 11

Total receipts, including balances	\$6,270,396 22
Disbursements for same period	5,630,219 29

Leaving cash balance in the treasury, Nov. 15, 1882 \$640,176 93

The above balance is to the credit of the following funds, to wit:

General revenue fund	\$413,356 29
Sinking fund	203,592 70
State common-school fund	17,927 94

Total \$640,176 93

The value of all the taxable real estate and personal property in Ohio, according to the consolidated tax duplicate for 1882, is as follows:

Real estate in cities, towns, and villages	\$413,999,976 00
Real estate not in towns, cities, and villages	702,631,679 00
Chattel property	518,229,079 00

Total taxable values for 1882 \$1,634,910,734 00

Net increase in the valuation, as compared with 1881 \$47,703,135 00

The taxes for 1883, levied upon the foregoing basis of \$1,634,910,734, are as follows:

General revenue fund (1 $\frac{1}{2}$ of a mill)	\$2,285,537 47
Sinking fund ($\frac{1}{4}$ mill)	816,299 70
Common-school fund (1 mill)	1,633,911 00

Total for state purposes (2 $\frac{1}{10}$ mills) \$4,735,748 17

County expenses	\$2,584,913 74
The poor	762,139 87
Bridges	1,570,440 26
Buildings	737,439 94
Roads	1,036,833 68
Payment of debts	693,409 35

Total for county purposes \$7,384,776 84

Local taxation as follows:

Township expenses	\$1,006,093 37
School and school houses	6,843,699 63
City, town, and village taxes	7,123,177 57
Other special purposes	1,532,459 25

Total township, city, school, and special taxes \$16,507,459 87

Total county and local taxes levied in 1882 \$23,892,236 71

Total levies made in 1882 for all purposes \$23,627,934 88

Per-capita tax on dogs—sheep fund 231,633 00

Total levies made in 1882 (including per capita dog tax) for all purposes \$23,859,617 88
Add delinquencies and forfeitures of previous years 1,990,301 03

Total taxes for 1882, including delinquencies, &c. \$30,850,418 91

—There was a noticeable increase in the amount of capital invested in the stock of national banks over what was reported in 1881. This increase is confined almost entirely to the large cities. The valuation and taxation of the property of such banks for 1882 are as follows:

The total valuation of national banks, as equalized by the several county and city boards of equalization for the year 1881, was \$21,778,313 20

The valuation of this class of property, as equalized by the several county and city boards of equalization for the year 1882, is 25,355,633 41

An increase over the valuation of 1881 of 3,577,370 21

Total valuation of state banks for taxation, as fixed by the several county and city boards of equalization for 1881, was 1,186,233 09

The valuation of this class of property, as fixed by the several county and city boards for 1882, is 1,406,390 00

An increase over the valuation of 1881 of 220,156 91

—The report of the board of public works shows revenues from the canals as follows:

Miami and Erie canal	\$98,764 67
Ohio canal	57,703 27
Muskingum improvement	17,659 56
Hocking canal	5,614 43
Walhonding canal	1,573 89

Total \$181,316 12

The total receipts of the year, including appropriations by the legislature, were \$226,748 97; total disbursements, \$222,059 94. This, added to \$4,000 fraudulently drawn out by the defaulting clerk of the board, makes a total of expenditures \$226,059 99, and leaves a balance of \$688 98 in the state treasury to the credit of the canal fund.—The number of boats in use on the different canals is given as follows: Hocking, 241 private boats, 11 state boats, and 3 dredges; Miami and Erie, 97 private boats, 8 state boats, and 2 dredges; Muskingum river, 9 steamers, 43 flat barges, and 10 United

States boats.—The report for the year ending June 30, 1882, shows the average number of miles of railroad operated during the year to have been 6,040, an increase over the previous year of 3·504 per cent. The total stock and debt on June 30, 1882, was \$483,963,079 83; the average amount of stock and debt of the roads operated during the year was \$489,252,387 64, being an increase of 14·92 per cent.; the net earnings were equal to 3·115 per cent. of the above amount of stock and debt, or to \$14,694,210 92. The gross earnings amounted to \$46,737,163 80, or 1·9095 per cent. increase. Of this amount \$12,335,239 73 were received from passenger traffic, an increase of 19·52 per cent.; \$32,312,140 94 were from freight, a decrease of 3·302 per cent.; \$1,143,532 43 were from mail, an increase of 20 per cent., and \$1,146,385 55 were from other sources, an increase of 32·88 per cent. The operating expenses amounted to \$32,042,952 88, an increase of 9·35 per cent. The maintenance of way and structures made up \$7,149,722 84 of this amount, being an increase of 5·94 per cent.; the cost of conducting transportation was \$12,485,529 06, an increase of 9·90 per cent. The operating expenses were 68·55 per cent. of gross earnings, as against 64·14 per cent. for the previous year. The number of passengers carried during the year increased 27·95 per cent., and was equal in amount to each inhabitant of the state being a passenger about four times. The passenger mileage increased 19·417 per cent., while the rate per m. received from each decreased from 2·336 to 2·310, or 1·114 per cent. The total tonnage carried during the year increased 10·76 per cent., and was equal to about 9 tons moving for each inhabitant of the state. The total ton mileage increased 8·37 per cent., and the rate per ton per mile decreased from '015 cents to '807 cents, or 11·863 per cent. In comparing the year 1882 with the year 1872, it is found that the mileage has increased 59·51 per cent.; the gross earnings, 36·43 per cent.; the operating expenses, 35·34 per cent.; the passengers carried, 142·04 per cent.; the passenger mileage, 99·95 per cent.; the freight tonnage, 191·93 per cent.; and the ton mileage, 181·98 per cent.; while the rate paid per passenger decreased from 2·935 cents to 2·310 cents, or 21·295 per cent.; and the rate per ton per mile decreased from 1·569 cents to '807 cents, or 49·2 per cent.—The state school commissioner furnishes the following statistics: Number of youth of school age in the state in September, 1882, 1,081,321; number of youth of school age in the state in September, 1881, 1,063,337; number of school houses in township districts, 10,968; number of school houses erected within the year, 528; cost of school houses within the year, \$1,123,688; estimated value of school houses, including grounds, \$23,610,858; number of teachers necessary to supply schools, 17,117; number of different teachers actually employed, 24,135; average num-

ber of weeks the schools were in session, 31; number of pupils enrolled in the schools, 751,101; average number of pupils in daily attendance, 483,232; number of school officers, 52,151; total receipts, including balance on hand Sept. 1, 1881, \$12,236,357 63; total expenditures, \$8,335,475 48.—The report of the state board of agriculture, made up to Dec. 1, 1882, places the acreage of wheat sown at 2,741,560, and the yield at 38,506,370 bushels. The yield of corn is placed at 87,386,260 bushels; oats, 16,732,154 bushels; potatoes, 6,131,725 bushels. The number and value of the live stock in 1882 were as follows: horses, 714,585, valued at \$42,207,378; cattle, 1,518,755, value \$26,941,612; mules, 22,891, value \$1,563,452; sheep, 4,594,607, value \$13,383,249; hogs, 1,624,077, value \$6,587,148.—The social statistics of the state show that during 1882 there were 30,528 marriages; 69,914 births; 34,173 deaths; 1,228 persons sent to insane asylums; 18,266 paupers supported in and out of the county infirmaries, at a cost of \$828,146 87; number of persons in the benevolent institutions Nov. 15, 1882, 178 blind, 431 deaf and dumb, 499 idiotic and imbecile, 677 in soldiers' and sailors' orphans' home; number in penitentiary during the year, 1,767; in workhouses, 4,674; boys and girls in reform and industrial schools, 1,426.—By the report of the adjutant general it is shown that the present force of the Ohio national guard consists of 79 companies of infantry, 1 troop of cavalry, and 6 batteries of light artillery, and a total number of 5,875 men, including officers, being a reduction of 1,469 during the year.—The population of the principal places, by the census of 1880, was: Cincinnati, 255,139; Cleveland, 160,146; Columbus, 51,647; Toledo, 50,137; Dayton, 38,678; Springfield, 20,730; Zanesville, 18,113; Akron, 16,512; Sandusky, 15,838; Youngstown, 15,435; Canton, 12,258; Hamilton, 12,122; Steubenville, 12,093; Portsmouth, 11,320; Chillicothe, 10,938. See map in supplement to volume IX.

OLEOMARGARINE, Oleomargarine Butter, or Butterine. Oleomargarine, strictly speaking, is not butter, but is the butter fat obtained from beef fat according to the Mège process; while oleomargarine butter, or butterine, is the product obtained by churning oleomargarine with milk, and thus converting it into butter. About 1870, at a time when M. Mège-Mouriez, or Hippolyte Mège, was commissioned by the French government to investigate several questions of domestic economy, while improving the manufacture of bread, he was invited to make some researches with a view to obtain, for the use of the navy and poorer classes, a product suited to take the place of ordinary butter, which would be cheaper and capable of being kept without becoming rancid. M. Mège placed several cows on a restricted diet, which soon decreased in weight and furnished a proportionately less amount of milk; but the milk always contained butter fat, and this he

found to be the case even when the cows were wholly deprived of food. He naturally asked where the butter fat came from. The answer was, from the fat of the animal. M. Mège next tried to produce butter fat from the fat of the cow by artificial processes, and it was not long before he separated from the fountain head of butter fat a pure and sweet fat, free from foreign odor, which by simply churning with milk was readily converted into an excellent butter, essentially identical with the best butter made from cream. The process, as improved and simplified by constant practical working, and now largely carried on in the United States, may be described in detail as follows: Piece by piece, the fat is thrown into large tanks containing tepid water, where it is allowed to rest for an hour or more, when the water is drawn off and fresh water is introduced into the tank. It is then inspected, each piece separately, and thrown into another tank containing pure water, where it is again allowed to remain for about an hour. Only pieces rich in oil are thrown into this tank; all others are cut off and thrown into tierces, to be rendered into tallow. After the fat has remained long enough in this second tank, it is again inspected and thrown into a third, and subjected to another washing, by which time it is a perfectly pure white fat. It is next elevated, in cars holding about 600 lbs. each, to the top of the building or third floor, alongside of the disintegrating machines. These are similar to the

regular meat hasher. The hashing machine consists of a series of sharp blades set on an axis like the thread of a screw. These are contained in a closely fitting chamber or cylinder placed horizontally. The cylinder is divided into two portions, hinged together on one side, and capable of being securely fastened on the other when the machine is in operation. The upper half can be readily thrown back when it becomes necessary to clean the machine. A large trough is supported above the cylinder, on which the fat is dumped. This trough or feeder has an aperture in one corner, which fits over a corresponding hole in the upper part of the cylinder, through which the fat is fed to the machine. Piece by piece, the fat is introduced into the machines, and the revolving knives cut it very fine; after which it is forced out through a fine sieve at

the opposite end, and falls into kettles, to be subjected to the next process. The comminuted fat is in a condition which enables it to be rendered at a very low temperature. The rendering is done in a series of caldrons, jacketed and surrounded by water as represented in fig. 1. The water in the jacket is heated to the boiling point by the introduction of live steam, which in turn heats the caldron containing the fat, causing it to melt at a temperature varying from 114° to 122° F. Great care is taken to prevent it from getting above 122°, as the lower the temperature is kept, the better is the product obtained. During the rendering process about 5 per cent. of ordinary salt is added, which helps the membrane to settle. Each kettle holds about 2,300 lbs. of fat, the

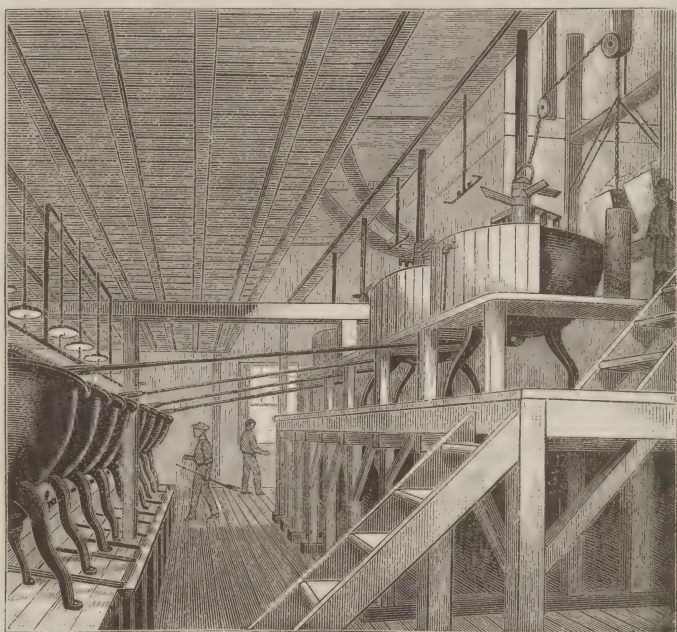


FIG. 1.

product of about one hour's work of the hasher. As soon as the fat falls into the kettle, the steam is turned on to heat the water in the jacket, and kept so for about an hour and a quarter, after which the accumulated heat is sufficient to finish the process. After the fat is completely rendered, cold water is run into the jacket. It is about two hours and a quarter from the time the hasher begins before the fat is allowed to rest. During the rendering it is kept in constant agitation by revolving agitators, which equalizes the temperature throughout the mass and facilitates the rendering. When the fat is allowed to rest, the membrane or "scrap" settles to the bottom of the kettle, leaving the pure fat on top. This separation is usually very successful; but if the fat has become water-soaked in the washing process, it is necessary to agitate

the whole mass rapidly several times, and then allow it to stand, when the membrane will sink to the bottom. The rendered fat must be left at rest for 20 or 30 minutes, when the pure fat may be drawn off and strained into the "settling kettles." An emulsion of water and oil in the condition of froth floats on the surface of the rendered fat, which is ladled off. The rendered fat is allowed to remain in the settling kettles from one to three hours, and is kept at a temperature of 118° to 122° F., the water in the jacket being kept at about 135° F. After the settling is complete, and the refined or rendered fat is at the proper temperature, it is drawn off through a fine sieve into tanks or cars, which are immediately removed to the "seeding room," which

completely filled, the butter oil flows from each package, from the weight of the plates above; when the press is completely filled, a very gradually increasing pressure is applied, which at the last amounts to about 3,000 lbs. to the square inch. The pressure is kept up until the butter oil ceases to flow from the bags or packages, leaving a cake of stearine perfectly dry, hard, and white. The press is then unpacked, and the cakes of stearine are removed from the bags in a condition to be packed for shipment. The butter oil is received in a large reservoir, and if it is to be shipped it is allowed to flow into perfectly clean tierces, where it solidifies, and is sealed up. The butter oil will keep in this condition an almost indefinite period. A considerable

quantity of it is exported to Europe, to be churned with milk into butter. This butter oil received the name of "oleomargarine," as it was thought to be composed principally of oleine and margarine. Heintz and Gössmann have shown that margarine is not a simple fat, but a compound consisting of palmitine and stearine, so that this name is a misnomer. The oleomargarine of commerce is to a large extent used directly as a cheap cooking butter. It is a light yellow substance, melts in the mouth like butter, and has an agreeable taste.—When not to be used for shipping or for consumption in its natural condition, the butter oil is pumped while warm from the reservoir over to the dairy room, where it is received in large cylindrical

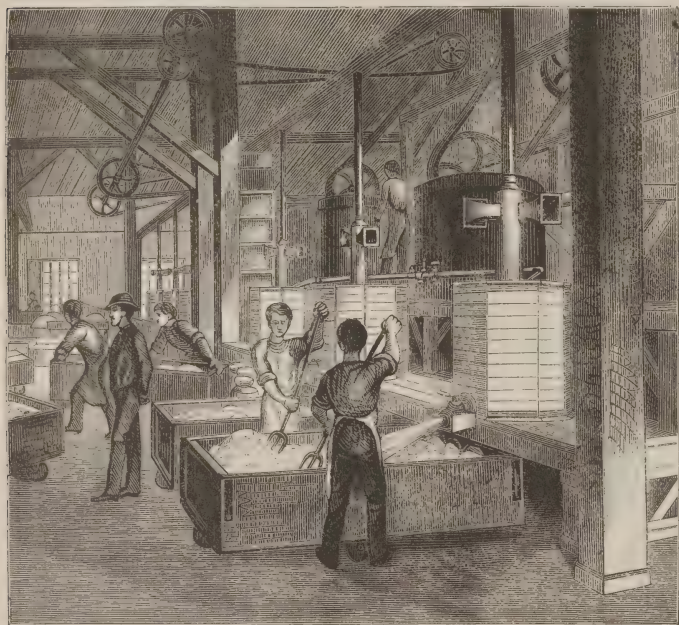


FIG. 2.

is kept at a temperature of 85° F. In this room the fat begins to solidify very slowly, the more solid constituents crystallizing out at first, and finally the whole mass assumes a kind of mushy consistency. The "seeding" or crystallizing process requires from 36 to 48 hours, and must not be hurried. When the rendered fat is in the proper condition, it is pressed so as to separate the butter oil from the stearine. To accomplish this, the fat is packed in cloths set in moulds, to form packages $13 \times 5\frac{1}{2} \times 2$ in. These packages are placed on plates of galvanized iron in the press, one above the other. Each plate holds 12 bags, and from 36 to 40 plates are used in each hydraulic press. The packages contain from 2 to 3 lbs. of fat, so that each press when filled holds about 1,200 lbs. It takes about an hour to fill a press. Before the press is

cal kettles, which keep it at the proper temperature to be used in the next operation. It is now to be churned with milk, and thus converted into butter. In Fig. 2 is represented that section of the dairy room known as the churning department. The churns hold about 600 lbs. of material, consisting of 442 lbs. of butter oil, 120 lbs. of milk, $37\frac{1}{2}$ lbs. of cream-made butter, and $1\frac{1}{4}$ oz. of bicarbonate of soda. The mixture is churned from about 5 to 10 minutes, when some coloring matter is added, and the churning is kept up from 30 to 40 minutes longer. The first agitation forms a perfect emulsion, while the continued motion gives it a homogeneous color.—When oleomargarine butter was first made in the United States, by Paraf, the contents of the churn, after the operation, were allowed to flow out into tubs, and when solidified worked on ta-

bles with salt, then packed and put on the market. This butter was crystallized, which gave it a gritty taste, and it could not be sold. No one seemed to have experimented or followed the direction given by Mège, and consequently for about a year the product had a very limited sale, which did not increase until Dr. Henry A. Mott of New York began a series of experiments to prevent the crystallization, the result of which experiments has been adopted by all the manufacturers. The process perfected and simplified by Dr. Mott is as follows: The churned mixture, a creamy-looking emulsion, is allowed to flow from the churns directly on pounded ice, which is kept in rapid agitation until the whole mass becomes solid. The crystallization of the butter is by this process completely prevented. The ice absorbs the sensible, and to a certain extent the latent, heat of the emulsion, not giving it time to crystallize. The congealed emulsion is left in contact with the ice for two or three hours, when the mass is dumped out on inclined tables. The larger pieces of ice are picked out by hand, and the smaller pieces melt out at the temperature of the room, which is kept between 85° and 90° F. The butter is left to soften for six hours or more. When the congealed emulsion has become soft, and all the ice and ice water has been drained off, the product is chopped up with wooden ladles, and then introduced into a small apparatus which has for its bottom a coarse wire sieve, through which the product is pressed, so that it comes out in shreds of various length and about one eighth of an inch in diameter. It is then placed on tables, and worked and salted by a revolving butter worker, turned by hand. The butter is now in a condition to be packed in tubs. If prints or rolls are to be made, it is allowed to stand for several hours until it gets somewhat harder. Dr. Mott suggested that the congealed emulsion, after it had softened and was passed through the sieve, should be put back into the churn and agitated with churned milk for a few minutes, for the purpose of giving the product a more marked butter odor and flavor, which to a certain extent was washed out by the melting ice; this additional process was used for several years, but as it added to the expense it was finally abandoned. If the ice is thoroughly picked from the congealed emulsion within three hours after it has been chilled, it can do very little damage to the product. —Mège's process for preventing crystallization gives a butter far superior to that now produced; but this fact was not made known till 1880, through Mr. George Harding. The experiments conducted by Prof. Charles F. Chandler, Prof. C. P. Williams, and Dr. Henry A. Mott, under Mr. Harding's direction, resulted in the production of a butter superior in flavor, odor, and texture to any previously made. The process is as follows: The emulsion from the churn is to be put into a tin

vessel, which can be closed, having an agitator within, which receives its motion from outside. This vessel is to be placed in water containing pieces of ice, the temperature of which is about 36° F. The agitator is kept in motion until it can no longer be turned, when the solidified whipped product may be removed. A large ice-cream freezer of the capacity of 40 quarts gives excellent results. As the emulsion in solidifying does not come in contact with the ice or ice water, its flavor and odor remain in the congealed mass unimpaired. The butter thus obtained is highly suitable for winter use, as it is much softer than butter made by throwing the emulsion upon ice.—At the works of the "Commercial Manufacturing Company," New York, 50,000 lbs. of butter are made daily, all of which finds a ready sale, the price ranging from 15 to 22 cts., according to the season and to the form in which it is put up. By law, every tub or package of butter sold must be branded "Oleomargarine Butter." This of course had for a time its effect upon the sale of the product; but as oleomargarine butter is a pure and wholesome article of food, possessing all the qualities of good dairy butter, the people have overlooked the name and have decided to eat it. The products obtained from 100 lbs. of fat are as follows: butter oil, 34½ lbs.; stearine, 10 lbs.; tallow, 28 lbs.; scrap, 24½ lbs.; waste or loss, 3 lbs. To make about 50,000 lbs. of butter a day, it is necessary to treat 122,000 lbs. of fat a night. This amount of fat will yield, at the rate given above, 41,882 lbs. of butter oil or oleomargarine, which, with 20 per cent. added for milk and salt taken up, will make 50,258·5 lbs. of butter. At current rates, the returns will be as follows:

Butter, 50,258·5 lbs., at 15 cts.....	\$7,538 77
Stearine, 12,200 lbs., at 7½ cts.....	915 00
Tallow, 34,160 lbs., at 6½ cts.....	2,305 80
Scrap, 30,098 lbs., at 0·27 ct.....	81 25
Total from 122,000 lbs. of fat.....	\$10,840 82

Deduct expense of working:

Fat, 122,000 lbs., at 5 cts.....	\$6,100 00
Wages of 250 men.....	800 00
Milk, 4,161·3 qts., at 4·5 cts.....	187 61
Salt, 2,513 lbs., at 1 ct.....	25 13
Ice, at \$5 per 2,000 lbs.....	62 82
Bicarbonate of soda, 10 lbs., at 2½ cts.....	25
Tubs (55 lbs.), 9,180, at 30 cts.....	2,740 80
Rent, insurance, and interest on money.....	53 43
Trucks, horses, etc., at 3 cts. a tub.....	50 00
Butter, 3,008 lbs., at 30 cents.....	902 40
Fuel.....	53 12
Hogsheads for stearine (1,050 lbs.), 11·6, at 70 cts.....	8 12
Hogsheads for tallow (1,250 lbs.), 27·3, at \$1·50.....	40 95
Butter color.....	80 00
Contingencies.....	20 17

Total..... \$10,575 00

Receipts from 122,000 lbs of fat.....	\$10,840 82
Cost of fat, milk, labor, etc.....	10,575 00

Profit per day..... \$265 82

Deducting the receipts exclusive of butter (\$3,302 05) from the expenses (\$10,575), the cost of making 50,258·5 lbs. of butter is found

to be \$7,272 95, or at the rate of 14·4 cts. a pound. There are several other oleomargarine butter factories in the United States. They are in Philadelphia, Baltimore, Pittsburgh, Louisville, Chicago, St. Louis, Cincinnati, New Haven, Providence, and Boston. Butter is not manufactured during July and August, but oleomargarine or butter oil may be made and stored, to be worked into butter during the colder months. The number of cattle killed in one year in New York city is 624,000, which, at the ascertained average of 112 lbs., would yield 69,888,000 lbs. of fat. The conversion of this fat into butter according to the Mège discovery, instead of into tallow by the old process, would yield a profit to the commerce of New York of \$3,377,391. The possible production from the fat of the whole United States would be 297,537,000 lbs. of butter oil, which, by the addition of 59,507,400 lbs. of milk (the product of 2,975,200 cows) required to convert it, would make 357,044,400 lbs. of oleomargarine butter.—Dr. Henry A. Mott has made an elaborate analysis of oleomargarine butter which is given below. It demonstrates that every element which enters into the composition of the best dairy butter is to be found in oleomargarine butter, and no element is present in the latter that is not present in the former:

CONSTITUENTS.	Cream butter.	Oleomargarine butter.
Water	11·968	11·203
Butter solids.....	88·032	88·797
Total.....	100·000	100·000
Insoluble fats. { Oleine.....	23·824	24 893
{ Stearine.....		
{ Arachine.....	51·422	56·298
{ Myristine.....		
{ Butyrine.....	7·432	1·823
Soluble fats... { Caprine.....		
{ Caproine.....		
{ Capryline.....		
Caseine.....	·192	·621
Salt.....	5·162	5·162
Coloring matter.....	trace	trace
Total.....	88·032	88·797

The only difference between the two products is in the proportion of volatile fats, which give the aroma and flavor to butter, and at the same time decompose and render the product rancid. The amount of these volatile fats in oleomargarine butter is sufficient to give to the product the so much prized flavor and odor, but not sufficient when decomposed to make the product rancid; and for this reason oleomargarine butter keeps sweet and pure for a much longer period than dairy butter. Under the microscope, oleomargarine butter has identically the same appearance as butter made from cream. Once in a while crystals of butter fat are to be seen in the field; but, as similar crystals are sometimes to be found in the field of dairy butter, no distinction can be drawn from this fact. If cream butter is

melted and allowed to cool slowly, the whole mass becomes crystallized; and this was found to be the case with the oleomargarine butter which was made before ice was used to chill it suddenly from a fluid emulsion to a solidified condition. If the agitation of the emulsion in contact with the ice is carelessly done, some portions of the butter will be seen to contain crystals when examined under the microscope. The same is found to be the case with winter-made dairy butter; warm water is often poured into the churn, and melts some of the butter, which on cooling slowly is also found to contain crystals.

OLLIVANT, Alfred, an English prelate, born in Manchester in 1798, died at Bishop's Court, Llandaff, Dec. 18, 1882. He was educated at St. Paul's school, London, whence he obtained an open scholarship to Trinity college, Cambridge, in 1818. His was one of the most brilliant careers ever spent at that university. He won the Craven scholarship in 1820, and graduated in 1821 as the chief classic of the year, senior chancellor's medallist, and sixth wrangler in the mathematical tripos. In 1822 he gained the Tyrwhitt Hebrew scholarship, and in 1822 and 1823 the senior and middle bachelor's prize for Latin prose. He was a fellow of his college till 1827, when he became vice-principal of St. David's college, Lampeter, during which period he acted as examining chaplain to Bishops Jenkinson and Thirlwall, and obtained a thorough knowledge of the Welsh language. In 1843 he was appointed regius professor of divinity at Cambridge, to which was annexed the living of Somersham, in Huntingdonshire. In 1849 he was consecrated bishop of Llandaff, in succession to Dr. Coplestone. His principal works are: "Sermon at Consecration of St. David's College Chapel" (London, 1827); "Necessity of Decent Celebration of Public Worship" (1828); "An Analysis of the Hebrew Text of the History of Joseph," "Sermons" (1829 and 1831); "Llandoverly" (1841); "Introduction to the Course delivered before the University of Cambridge in Lent Term" (Cambridge, 1844); "On the Missionary Bishops Bill and the Church Protestant Defence Society" (London, 1854); "Fabric of Llandaff Cathedral from 1575 to its Reopening in 1837" (1857; 2d ed., 1860); "Reasons for withdrawing from the Dissenting Ministry and seeking Ordination in the Church, with Particulars of the Life and Ministry of C. I. S. Russell" (1862); "Two Letters to his Clergy concerning Bishop Colenso on the Pentateuch" (1863); "The Want of Unity in the Church, and the Church's Teaching as to Confession" (1873). His work for the diocese was very large, and during his episcopate more than 200 churches were built, rebuilt, or restored.

O'NEIL, Henry, a British painter, born in St. Petersburg in 1817. His works, which are mainly historical and genre, include "Martha and Mary informing Christ of the Death of Lazarus," "By the Rivers of Babylon," "Mo-

zart's Last Moments," "Ahasuerus and the Scribes," "Rosalind and Celia," "Eastward Ho!" "Home Again!" "Mary Stuart's Farewell to France," "Before Waterloo," "Rebecca and Ivanhoe," "An Incident of the Plague of London," and "The Parting Cheer." He has published a pamphlet on "Modern Art in England and France" (1869), "The Age of Stucco, a Satire in Three Cantos" (1871), and lectures on art.

ORCHARDSON, William Quiller, a British artist, born in Edinburgh in 1835. He began his career as a portrait painter. His best works include "The Challenge," "Christopher Sly," "An Old English Song," "The Story of a Life," "Choosing a Weapon," "The Market Girl from the Lido," "Toilers of the Sea," "A Hundred Years Ago," "The Forest Pet," "Cinderella," "Moonlight on the Lagoons," "Flotsam and Jetsam," "The Bill of Sale," "The Old Soldier," "The Queen of the Swords," "A Social Eddy left by the Tide," "The Virtuoso," and "Prince Henry, Poins, and Falstaff." Mr. Orchardson was elected an academician in 1877.

OREGON. The population of the state in 1880 was 174,768, of whom 103,381 were males, 71,387 females, 144,265 natives, 30,503 foreign, 163,075 whites, 487 colored, 9,512 Chinese, and 1,694 Indians.—The chief agricultural productions were 920,977 bushels of barley, 126,862 of corn, 4,385,650 of oats, 13,305 of rye, 7,480,010 of wheat, 266,187 tons of hay, 244,371 lbs. of hops, 1,359,930 bushels of potatoes; number of horses, 124,107; 2,804 mules and asses, 4,132 working oxen, 59,549 milch cows, 352,561 other cattle, 1,083,162 sheep, 156,222 swine; value of manufactures, \$10,931,232; gold mined, \$1,097,701; silver, \$27,793; 43,205 tons of coal; value of fishery products, \$2,781,024.—There were 1,068 public schools, including 17 high schools; expended for school purposes, \$316,885; pupils enrolled, 37,437; average attendance, 26,563.—In 1881 the value of wheat and flour exported to foreign countries was \$6,812,425; of all exports, \$8,124,368. The shipments to San Francisco amounted to about \$6,000,000 in addition.—The assessed value of property in 1881 was \$59,256,175; taxes thereon, \$325,908 75. There has recently been a considerable extension of railroads in the state.—The following statistics are for the year 1881-'2: acres of land assessed, 5,201,654; value, \$28,280,847; value of town lots, \$9,727,988; value of improvements, \$9,993,906; merchandise and implements, \$11,114,159; moneys, notes, and accounts, \$15,432,444; household furniture, carriages, etc., \$2,824,277; horses and mules, 114,024; value, \$4,831,352; cattle, 269,412; value, \$2,771,040; sheep, 854,750; value, \$1,401,837; swine, 85,218; value, \$193,816; gross value of all property, \$86,531,716; indebtedness, \$22,300,912; exemptions, \$4,973,058; total taxable property, \$59,257,746; state tax, \$325,917 38; school children, 61,641.—The current expenses during the fiscal years 1881

and 1882 amount to about \$400,000, and leave a balance of \$110,000 in the treasury. The requisite funds have for a long time been in the treasury, with which to pay the soldiers' bounty and relief bonds, but the holders could not be compelled to receive payment, and preferred to retain them as an investment. In October, 1880, there was outstanding a bonded indebtedness known as "the Modoc war bonds," which amounted to \$132,858 72, with accrued interest. But these have been redeemed in full. Upon the Umatilla Indian war bonds there is still due \$28,171; upon the bonds issued under the act of October 25, 1880, \$60,000. A continuation of the half-mill tax four years longer will more than pay off the entire amount. This is all the general bonded indebtedness of the state, and, if the claims referred to are allowed at any reasonable amount against the United States, they will bring into the treasury a surplus of several thousand dollars. There is a bonded debt payable to the Willamette falls canal and locks company, which has been reduced to the sum of \$68,000, and the treasurer has money on hand to pay off about \$30,000 more. There is another special indebtedness known as the road warrants; but the balance due upon them is small, compared with the amount and value of the swamp and overflowed lands the state is entitled to under the act of Congress of March 12, 1860.—The new insane asylum, which cost \$175,000, was ready for inmates at the close of 1882. The last legislative assembly organized the school for deaf-mutes by providing for a board of directors. The insane and idiotic are kept under contract. The whole number in charge is 315, of whom 221 are males and 94 females. The number of convicts in the state penitentiary on Aug. 31, 1882, was 178.—The average attendance during 1880-'81 in the collegiate department of the state university was: free students, women, 18; men, 32; total average, 50; pay students, women, 21; men, 18; total average, 39. The grant of ten sections of land for the completion of public buildings has been fully realized. The seventy-two sections set apart for a state university have been selected, and about 29,000 acres thereof sold, leaving about 17,000 acres unsold. The 90,000 acres granted under the act of July 2, 1882, for an agricultural college, have been selected, and about 26,000 acres thereof sold. The sixteenth and thirty-sixth sections in each township, granted to the state for the use of schools, are being sold from time to time. The funds arising from the sales of the lands included in the said grants amount to the following sums:

The university fund, principal.....	\$62,000
The agricultural college fund, principal.....	65,000
The common-school fund, principal.....	655,000

The investment of these funds, under the present rate of interest, has become very difficult.—The population of the principal places, by the census of 1880, was: Portland, 17,577;

East Portland, 2,934; Astoria, 2,803; Salem, 2,538. See map in supplement to volume XV.

O'SHAUGHNESSY, Arthur William Edgar, an English poet, born in London, March 14, 1846, died there Jan. 30, 1881. When a mere boy he entered the British museum as a transcriber in the department of printed books. In 1866 he was made senior assistant in the department of natural history, and devoted himself there to the classification of reptiles and fishes. He published "An Epic of Women and other Poems" (1870); "Lays of France" (1872); "Music and Moonlight," poems (1874); "Fayland," a volume of prose tales (1876), and "Creation" (1878). His wife, Eleanor, has edited books for children.

OSTRICH. Before the era of ostrich farming our principal knowledge of this bird was derived from travellers and hunters, whose fragmentary accounts led naturalists into many errors concerning its character and habits. These errors still exist in many works on the subject, but the extent to which ostrich farming has been carried during the past fifteen years, and the constant observations that have been made during that time, will soon render the character of the ostrich as well known to the world as many of our common domestic birds. The development of this new industry is one of the wonders of the times. It seems strange that a bird which is described in detail by the earliest of the sacred writers, and which was prized for its plumage by the ancient Egyptians and all other civilized peoples, should never have been tamed for the sake of its feathers; more especially does it seem strange when we consider that the Egyptians have from time immemorial been reckoned adepts in the art of artificial incubation, and have consequently had the best opportunities for hatching the birds and rearing them in a domesticated state. Yet it was not till about 1865 that ostrich farming became a practical industry, and then it was not in Egypt, or by the Egyptians, but by the English colonists in South Africa that success was attained. One of the first to introduce the industry into Egypt was an Englishman, Col. Gordon, who in 1878 sought information on the subject from a Cape Colony farmer. It should be mentioned, however, that some success had been achieved in Algeria, under the auspices of the Paris acclimatization society, as early as 1859. Tame ostriches were kept at the Cape as early as 1720, mention being made of them in Kolben's "Cape of Good Hope," but the credit of introducing practical ostrich farming is generally conceded to W. Kinnear, a farmer of Beaufort West. In 1865 there were 80 tame ostriches in the Cape Colony; in 1875, about 140,000; at the present time (1883), there are between 700,000 and 800,000. Within the past few years ostrich farming has extended through the other South African colonies, and has been introduced not only into the North African states, but into Australia and New Zealand, into South Amer-

ica, and lastly into the United States. There are several ostrich farms in Egypt, one near Cairo containing about 200 birds. The governments of South Australia and New Zealand have recently given special encouragement to ostrich farming, the latter in the shape of bounties for chicks imported, and the former in grants of land, many tracts of which have been run down by over-grazing with sheep. A few birds had been previously (1870) imported from the Cape under encouragement from the acclimatization society of Victoria. Now one farm, near Melbourne, has over 100 ostriches, and another at Borassa, near Gawler, has about 50. The first shipment of feathers from Australia to London has been made quite recently, and the prices reported compared favorably with those of Cape feathers. The African ostrich has been imported into Buenos Ayres and other parts of South America, with the idea of displacing the native rhea; but the experiments do not appear so successful. At the close of 1882, 22 Cape ostriches were brought to New York, and they have been introduced into southern California. The climate of some parts of California, Colorado, and neighboring states seems favorable for ostriches, and some South American ostriches are already acclimatized there. At the time of writing (July, 1883), a brood of young birds are being reared on the California farm, which is at Anaheim, in Los Angeles Co., under the management of Dr. Sketchley. The first experiment having been considered a success, the manager has gone to South Africa to make further importations of birds. The feathers imported into the United States during the fiscal year ending June 30, 1880, were valued at \$1,359,454; during the year ending June 30, 1881, the value was \$1,840,531, and during the year ending June 30, 1882, it was \$3,369,179; during the six months ending Dec. 31, 1882, it was \$1,738,118. The Canadian imports in 1882 amounted to \$206,121, of which only \$10,493 were imported in a raw or undressed condition. In the first years of ostrich farming, the prices obtained for birds were very high. Up to 1880, a chick just out of the shell would bring £5; a bird six months old, £15 to £20; a year old, £25 to £30; two years old, £50; and when a pair were proved to be good breeding birds, from £100 up to £1,000 a pair. Between 1870 and 1880 the ostrich had effected a revolution in the pastoral character of the Cape. Sheep farming having been for some years unprofitable, owing to the exhaustion of the land by overstocking, the sheep runs were everywhere turned into ostrich camps, the profits in the latter being rapid and certain. About 1880, however, a period of speculation set in; the rapid multiplication of farms and birds combined with other causes to effect a fall, not only in the value of birds but in the price of feathers in the continental markets; and these circumstances, occurring with the outbreak of new epidemic diseases among the birds, put upon

Ostrich farming in South Africa a sudden check, from which it has not yet fully recovered. The longest and best ostrich feathers are taken from the wing and tail. In the wing is a row of 24 long feathers of pure white, known in the trade as "primes" (primaries), their snowy whiteness being so preserved by the covering of other feathers that they are often hidden from view till the wing is lifted. These are often found to be so pure and graceful that their appearance is damaged rather than improved by the feather dresser. From the primary row forward on the wing the feathers become more and more gray, till they finally are black or uniformly gray, according to sex. But, though one row of primaries is the rule, there are birds that possess two and even four rows of pure white feathers, numbering sixty or eighty plumes in each wing. White tail feathers vary greatly in size and number, and are not so highly valued, on account of their liability to become soiled or worn off at the tips. Feathers are first clipped when birds are a year old; and thereafter usually once in eight months, in the case of all except the "primes" and "seconds," which farmers now cut every six months, the stumps of the quills being left two months to mature, so that they can be extracted without pain and injury to the bird. Formerly it was the rule to pluck the birds, but this practice, which caused bleeding for days, was discarded, both from motives of humanity and because it was found that out of the root of a feather thus twisted from the bird the new feather grew stunted, disfigured, and often twisted like a corkscrew. In clipping, the birds are generally put into a pen and then blindfolded, while the quills are cut with stout shears an inch or two above the roots. Formerly almost all the ostrich feathers were purchased by white traders from native African hunters, both in the north and south of the continent; but the days of hunting wild birds by Bushmen disguised in an ostrich skin are numbered, and the great development of farming, and the proof afforded that, under good conditions, tame feathers compare well with wild ones, will soon throw all this traffic into the hands of the farmers. In 1840 the export of wild feathers from the Cape was 1,715 lbs., valued at £1,649; in 1860 the quantity was 2,297 lbs., and the value £19,261. In 1880 the weight was over 100,000 lbs., and the value nearly £1,000,000. Up to this period the value had more than kept pace with the quantity; but since 1880 the quantity has increased and the average price has fallen. In the first nine months of 1882 the export of Cape feathers was 201,731 lbs., valued at £894,378. Really good plumes are still both scarce and dear, and the American market has never been supplied with ostrich feathers of a good class. South Africa produces by far the greatest quantity of feathers of any part of the world. The annual value of feathers from the chief feather exporting countries will be as follows in round num-

bers: The Cape, including Natal, £1,200,000; Egypt, £260,000; Barbary, £120,000; Mogador, £20,000; Senegal, £3,000. The great feather mart of the world is Mincing lane, London, where, next to the few feathers that come from Damascus occasionally, the Barbary feathers rank highest in value. The North African bird, producing the Tripolitan, Barbary, and Egyptian feathers, is a distinct species from the South African ostrich. So great is the difference in the plumage that a novice could easily distinguish the difference between a raw feather from a Barbary bird and one from a Cape bird. Recognizing this, a Cape farmer, a few years ago, introduced a pair of Barbary birds into the colony, and, though the female bird in this case proved barren, the birds themselves have thriven, and the acclimatization of the North African ostrich there may be looked upon as easy of accomplishment. This, with the superior knowledge of artificial incubation possessed by the Cape farmers, will probably make South Africa for many years still the most important ostrich-feather-producing country in the world. The North African ostrich has a dull-white head and pink neck; the South African, a gray head and darker gray neck, and, though its legs and beak turn to a bright red in the breeding season, the colors are not so deep as with the Barbary and other North African birds. The North African hens have lighter body feathers, though, perhaps, not lighter wing feathers, than the Cape birds, and their feet, or toes, are shorter. The barbles on the feathers of a North African bird are more profuse and of a more equal length all the way up the shaft, while the shaft has noticeably more curve and grace. There are sometimes noticeable variations in the South African bird. Some South African cocks have been known to be nearly white, instead of black; but these were all reared in domestication from normally colored birds, and the difference is set down to the same law of variation which obtains among other domestic birds and animals. The duration of an ostrich's life is not yet known. Farming has been carried on about 20 years, and there are birds now domesticated that are known to be close upon 25 years old; but so far none are known to have died of natural decay. If the period from incubation to full development bears analogy with common fowls, an ostrich's life would be 25 or 30 years; but most ostrich farmers are inclined to place their age at about 50 years. The period of incubation for a common hen's egg is 21 days; an ostrich's egg takes 42 days to hatch. About the fortieth or forty-first day the chick may be heard to breathe in the shell. Sometimes the egg-shell is so thick (some being about $\frac{1}{8}$ in.) that the chick cannot break out, in which case the cock has often been known to break the shell under his breast-bone. When hatching is done artificially, the farmer brings out weak chicks by breaking the shell with light taps of a hammer. For the first

two days the chick lives upon the portion of the egg which has been absorbed through the navel; on the third day it will begin to hobble about, picking up bits of its shell or gravel, which afterward serve the purpose of grinding its food in the gizzard. In an adult ostrich's gizzard over 900 stones, varying in size from a pea to a walnut, have been found. The chick's first food, which it seeks from the third day, consists of grass, plants, insects, and small reptiles. In their wild state this forms their chief food through life; but on the farms their principal food is mealies (Indian corn) and grass, or the fleshy leaves of the prickly pear, which are chopped in small pieces for them, the prickles being singed off in a fire. The ostrich chick is very pretty, having a beautifully dappled neck (black and brown) and a shapely bill, bright eyes, and intelligent head and crown. Up to the first month its back is covered with tiny, thorn-like quills, black and white interspersed, underneath which is a thick coat of yellowish-brown down. This gives it such an appearance and color that, when at a signal of danger from its mother it lies squat upon the earth, it cannot be distinguished from the ground about. A chick grows in a month to be as large as a good-sized turkey. At six months the dapples have disappeared, and the down has developed into feathers, and at a year the feathers may be cut for the first time. The male bird's feathers turn to black, with certain white and gray feathers (which form the choicest plumes) in the wing and tail; and the female's turn to gray, with white feathers of less average value in the wing and tail. Young birds in good health, when let out of shelter in the morning, will start off in a gambol which is very like the human waltz. With wings swaying and flaunting, they gyrate about the yard, the whole troop sometimes moving in concert, and presenting a highly amusing appearance. When in good spirits, they keep up their waltzing for an hour or more, and birds have been known to dance with such reckless zest as to break a leg. It is not till between two and a half and four years that the development of the pairing instinct shows the full maturity of the bird. A hen will lay about 14 eggs when hatching naturally; but as many as 25 or 30 when the eggs are taken from the nest to the incubator. Some cocks will only mate with one hen; others with two or more; but on the farms they are usually camped off in simple pairs. The conjugal instinct in these birds is variable; sometimes a hen will refuse to the last to mate with the cock that the farmer places with her; but these dislikes are frequently conquered by violence on the part of the cock, who kicks the hen around the camp till she submits to be his mate. During the mating and breeding season the beaks and scaly legs of both sexes assume a bright pinkish tint, sometimes approaching to vermilion. When pairing and hatching, they become jealous of intrusions, either by

other birds or by their keepers. The tamest cocks will then attack any one who comes into their camp. Indeed, while wild birds have seldom been known to attack a man, the tamest of the domestic birds are most vicious and uncertain at these times. Native herd-boys are sometimes killed outright by their vicious kicks; and there is a case on record where an ostrich broke a horse's back with a single blow from his foot. The so-called kick is a forward strike by which the ostrich aims to rip the enemy down with his toe; but the enemy is usually struck with the foot rather than cut with the toe-nail. In making an attack, the cock will lift his head and erect his feathers till he is twice his natural size, and with wings extended and wing-feathers exalted approaches his foe with deliberate strides and ferocious aspect. Having advanced a few paces, he suddenly squats on his knees and, inflating his neck with air, knocks it with a gurgling sound against his shoulders, first from one side then from the other, his expanded wings swaying alternately to the time of this movement. Then he suddenly springs up and, advancing some paces, repeats this challenge, till, coming near enough to the foe, he makes his attack in earnest. Sometimes the attack is sudden and without these preliminaries. If the farmer is provided with a pole, with a prong or a thorn brush on the end of it, he is tolerably safe, as this can be placed against the bird's neck, which is delicate and tender; or, if one can get hold of the neck, the bird is conquered at once, his only effort being then to escape. A slight fence, 2 or 3 ft. high, is generally a sufficient protection against a savage bird, as, owing to the formation of their legs, they are extremely awkward at jumping or getting over uneven ground. In crossing a ditch, they seem to attempt to jump with both feet at once. If one is caught in the open field with a savage bird, his best resource, when unarmed with a thorn "tuck," is to lie flat upon the ground, where he is at least secure from a kick. Even then birds have been known to roll upon and trample the prostrate form, bellowing with rage meanwhile; or, where they do not do this, they may bolt off to the other side of their camp, venting their unexpended fury in bellowings and hisses and furious racings up and down. An ostrich has no self control when either angry or frightened. On many occasions, troops of birds, when panic-struck, have run through fences, breaking their legs, or full tilt against a stone wall, killing themselves with the concussion. The ostrich has an unusually large heart and small brain; and some consider this sufficient to account for their wonderful timidity on some occasions and their extraordinary savageness on others. Yet they are not so utterly stupid as naturalists have thought them. Even in the matter of food they have a fair discrimination, and have been known to refuse certain kinds. It is true that, even in the wild state, ostriches have been known to die either

from gluttony or by being choked with pieces of bone, which they eat for the phosphate of lime; but it must be remembered that their system requires food in large quantities, which may render them liable to such accidents. Their senses of sight, taste, and hearing are acute, the latter not abnormally so, since when wild they are known to associate in friendly concourse with buffaloes, the latter profiting by the searching range of vision which the ostrich's keen eye commands, and the birds profiting by the acuteness with which the buffalo's ear detects sounds conveyed along the earth. The ostrich is not a heartless parent as is supposed. It is true that some parents will neglect their nests, or even eat their eggs, or their young ones; but as a rule they sit carefully, and when the young are hatched watch over them with great care. The cock sits during the night, and the hen during the day. By this provision of nature the hen, whose color is gray, is less liable to be disturbed by daylight foes, and has a better chance to keep up her strength after exhaustive laying, as she does not go on the nest till 8 or 9, and leaves at 4 or 5 in the afternoon. Again, the cock, which has greater strength to sit out long hours, has a color that accords better with the night, and is braver in meeting the midnight foes, such as jackals, tigers, hyænas, and porcupines. These sneaks do their best to entice, aggravate, or frighten the cock off the nest, and if they succeed they roll the eggs out. Once a nest is polluted by the touch of these animals, the ostrich never returns to it. The raiders cannot get their teeth round the eggs (some of which are 4 or 5 in. through the long diameter), but roll them to the nearest stone and there knock them till the shell is broken. A more ingenious enemy still is the white-breasted rook, which, watching when the hen ostrich leaves her nest, flies up in the air with a stone in its claws, and, poising itself high over the nest, lets it drop with unerring aim upon an egg, on the contents of which it feasts. When hatching, birds take pains to conceal the whereabouts of their nests, and even on the farms some birds are so ingenious and careful in this respect that in bush lands they may have finished their laying and have begun sitting before their nests are discovered. When going on the nests, they will sidle about in all directions, or pretend to be grazing, till an opportunity offers of squatting on the nest, which they do as suddenly and unexpectedly as possible. In leaving the nest, they dodge about in an equally mystifying way, so as to prevent any one telling from what direction they have come. They seem to have an instinctive knowledge of the proper temperature required for incubation, and during very hot days they may be found in a half sitting posture, so as to admit a current of air over the eggs, or they may leave them an hour or two in the middle of the day, a circumstance that has probably given rise to the impression that they were neglectful parents. A kindred

error is that which supposed that ostriches were in the habit of leaving their eggs in the sand to hatch, and this arose from the fact that in their wild state, where a cock might mate with two or three hens, more eggs were laid than could be covered, so that some were thus thrown outside of the nests; or a hen might lay three or four eggs about the ground before she paired with the cock, in which case instinct has taught her to reject such eggs as infertile. Eggs that are touched with greasy hands would probably be rejected by a sitting bird, though it is not so acute in this respect as some have supposed. The old notion that the ostrich buries its head in the sand when danger is near, is without truth. The only circumstance upon which such a fiction could have been founded is the possible one of a bird pushing its head under a bush when falling exhausted before the hunter. The impression gathered from some books of travel that the ostrich knows no rest, but is ever on the move, is not strictly correct. Requiring a great deal of food and being able to pick it in small quantities, they naturally get into habits of quick movement, and cover a great deal of ground; but, when they have had plenty of food, they may often be seen rolling about in the sand, or quietly pluming themselves, or sitting apparently fast asleep. It is a fact worthy of notice that, though by nature and reputation fitted only for the parched, sandy plains of the interior of Africa, where birds are often months without tasting water save what is extracted from the juices of plants, the birds that are reared in the low, moist districts of the Cape take to the water with delight, and not only bathe but swim about like swans. There are many extremes, both in the matter of disposition and intelligence, among ostriches; some are very gentle and tame, others seem never to get thoroughly domesticated; savageness and treachery characterize some birds in a peculiar degree, while a child might have the oversight of others; some are graceful, cunning, and intelligent in all their movements; others are both awkward and stupid. On the whole, however, the ostrich is not nearly so stupid as he has been represented; and many facts common to the experience of farmers and hunters could be cited to show that the bird's instinctive intelligence is pretty highly developed.

LOUDINOT, Achille François, a French artist, born at Damigny in 1820. He studied architecture under Huyot, and painting under Corot, and designed a large number of buildings in and around Paris, but gradually adopted painting as his sole profession. He has done some remarkable work in glass painting, especially the windows of the church of Saint Jacques du Haut-Pas. In 1877 he emigrated to Boston, Mass., taking with him a large number of his pictures, which were exhibited there. Among these are "A Storm of Wind" and "Dunes at Dunkirk."

OVERCOMERS, a new sect of Christian believ-

ers. The name is derived from the application of the word "overcome" as used in the following passages: "He that overcometh shall not be hurt at the second death" (Rev. ii. 11); "To him that overcometh will I give to eat of the hidden manna, and will give him a white stone, and in the stone a new name written, which no man knoweth saving he that receiveth it" (Rev. ii. 17); "He that overcometh, and keepeth my words unto the end, to him will be given power over the nations: and he shall rule over them with a rod of iron" (Rev. ii. 26, 27). The sect was founded by M. H. G. Spafford, formerly a ruling elder in the Presbyterian church, who was engaged in the revival meetings in Chicago under the preaching of Mr. D. L. Moody. Mr. Spafford was led by his studies to the acceptance of the doctrine, at variance with the confession of his own church, that only those who "overcome," or wholly converted Christians, are immediately saved, while all others, including the mass of the persons regarded in the orthodox churches as "converted," are "hurt at the second death," and cast into the lake of fire, where they suffer till they are purified; and that punishment is not eternal, but "age-abiding," and lasts only until the purification is accomplished. He was excluded from his church for heresy, when he, with other

church-members who, having adopted his views, had withdrawn from their churches, organized a new congregation. The Overcomers believe that the Scriptures are the inspired word of God, and accept the doctrine of the Trinity; and they claim that their church was organized with Abraham, and has since that time been buried away as a church, but that the religion to which it testifies has been represented by sanctified persons in the corporate church through the intervening ages. At the same time, they renounce church organizations, and teach that the true children of God, who constitute the "Bride of Christ," are called to step out and show the world, in every movement of their lives, a higher type of absolute holiness, urging a complete consecration of the whole being to the service of God. They hold that all souls will finally be restored through the atoning blood of Christ, but that, if a soul is not entirely consecrated to the service of God in this life, it must suffer severe purgatorial punishment. A congregation of Overcomers has been organized at Lake View, near Chicago, Ill., and a larger one at Valparaiso, Ind. A party of seventeen persons of this sect started during the summer of 1881 for Palestine, where, they believed, they had a divine mission to gather the Jews into the land of their inheritance, and rule over them.

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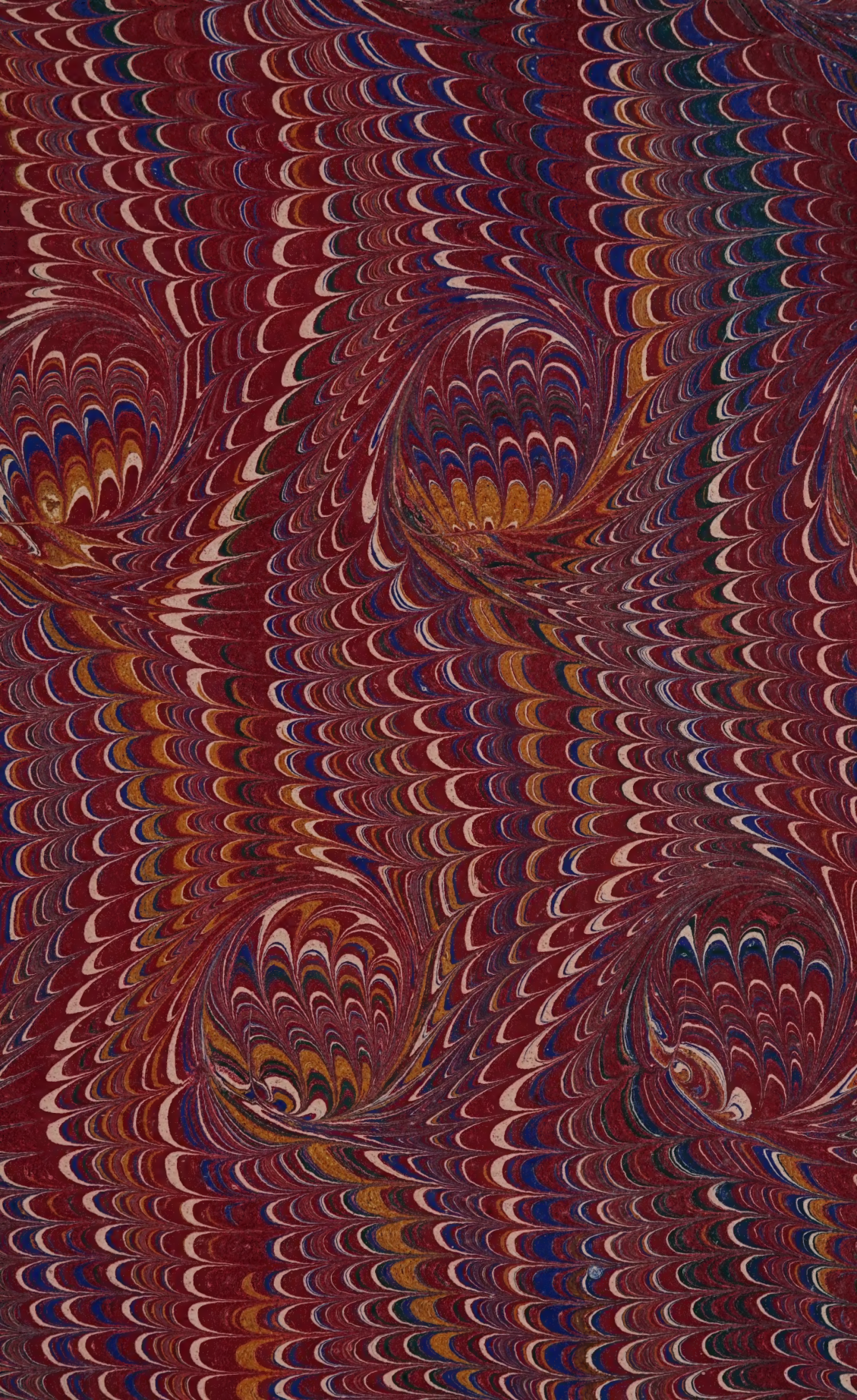
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